THE SCOTS GARDINER

FOR

The CLIMATE of SCOTLAND,

In THREE PARTS.

Treating of the following Particulars,

I. Of Contrivance and Design.
II. Of Gardens and Orchards, &c.
III. Of levelling, measuring, and dividing Land.
IV. Of cultivating and preparing Ground.
V. Of Forest and Fruit-Trees.
VI. Of gathering and preserving Fruits.

Together with

The GARDINER's KALENDAR,

[illegible]

The FLORIST's WALK-MECUM,

The PRACTICAL BEE-MASTER,

OBSERVATIONS on the WEATHER, and

The Earl of Haddington's TREATISE on FOREST-TREES.

Written originally by JOHN REID, Gardiner to Sir GEORGE MACKENZIE of ROSEHAUGH, and now carefully corrected, with Alterations and Additions,

BY

An EMINENT HAND.

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TO

The INGENIOUS PLANTERS

IN

SCOTLAND.

I DESIRE you to peruſe this Book; for there are many Things in it of ſingular Uſe, which I could never find in any, and the Subſtance of what I could find material, in the practical Part of Gard'nery, improved and applied home: whereby I preſume it may be ſatisfactory to you, when you operate in the Choice of Husbandry. Several weighty Reaſons induced me hereunto; as, The great Neceſſity of right Contrivance, whereby you may do your Works both orderly and cheap; The inexpreſſible Need of incloſing and planting, whereby you may improve your Eſtates to the beſt

Advantage,

Advantage, both for Profit and Pleaſure. And becauſe the many Books on Gardening are for other Countries and Climates, and many Things in them more ſpeculative than practical, this enſuing Treatiſe may prove the more acceptable; altho' obnoxious to the Cenſure of ſevere Critics, yet when I reflect on my Innocency in the Deſign thereof, the Good of my Country, I receive Encouragment. And that my Endeavours may prove ſucceſsful, is the earneſt Deſire of,

JOHN REID.

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THE SCOTS GARDINER.

PART I.

OF CONTRIVANCE OR DESIGN.

CHAP I.

How to make the Works about a Houſe REGULAR and UNIFORM.

SECT. I.

BY Contrivance, or deſign, my intention is to prevent the conſequences of inadvertency, or irregular procedure in incloſing and planting.

But as a houſe muſt be built before it is furniſhed, or the ground laid out round it for policy and planting, you may, in the firſt place, take a ſurvey of the plan of a houſe of my invention, fig. 1. It is but little; yet very commodious and cheap. There are only four rooms on a floor, all of which have their entry from the ſtair; yet communicate with one another. The door is in the middle; and there are ten ſteps up to the firſt ſtory, which comprehends the hall or dining-room, withdrawing-room, bed-chamber and waiting-room. You are likewiſe carried down by ten ſteps to the lower ſtory, which is half under ground and vaulted, where you have kitchen, cellars, larder, &c. The flat above the dining-room may be laid out in bed-

chambers, library and withdrawing-room; and above theſe you may have garrets or wardrobes. You may alſo have cloſets within the wall, tho' not demonſtrated in the plan. The roof may be divided into three; the middle part flat and covered with lead, and the two ſides ſloping and ſlated. Without there is a ſtair leading down from the hall to a parterre of graſs or gravel, on whoſe corners are two pavilions, opening without the line of the houſe, and ſet off in place of wings; one of which may be a ſtore-houſe, the other a pidgeon-houſe. The ſtables, bake and brew-houſe are moſt conveniently ſituated on the oppoſite ſide, as ſhall be hereafter demonſtrated.

II. Let the ſituation of your houſe be in a healthy ſoil, near to a freſh ſpring, defended from the impetuous weſt winds, northern colds, and eaſtern blaſts. Make all the buildings and plantings ly ſo about the houſe, as that the houſe may be the center; all the walks, trees and hedges running towards it. Therefore whatever you have on the one hand, make as much, of the ſame form and in the ſame place, on the other.

III. But if you would go to work regularly, you muſt firſt find the central line, by erecting a perpendicular on the middle of the houſe-front, to extend as far, both backwards and forwards, as you think requiſite for compleating your plan: hence you may draw parallels, meaſure and ſtake out your avenues, gardens, *&c.* as you pleaſe; always minding to meaſure alike on both ſides of the central line. How to find this central line, and to ſet off parallels, is taught in chap. III. § I. and II.

IV. For further illuſtration of this, ſee the draught, fig. 2. which, if rightly underſtood, may be applied to various purpoſes, and improven to great elegance.

In this ſmall ſcale, the houſe is ſituated in the center,

Fig 3 page 2 Fig 1 Fig 4

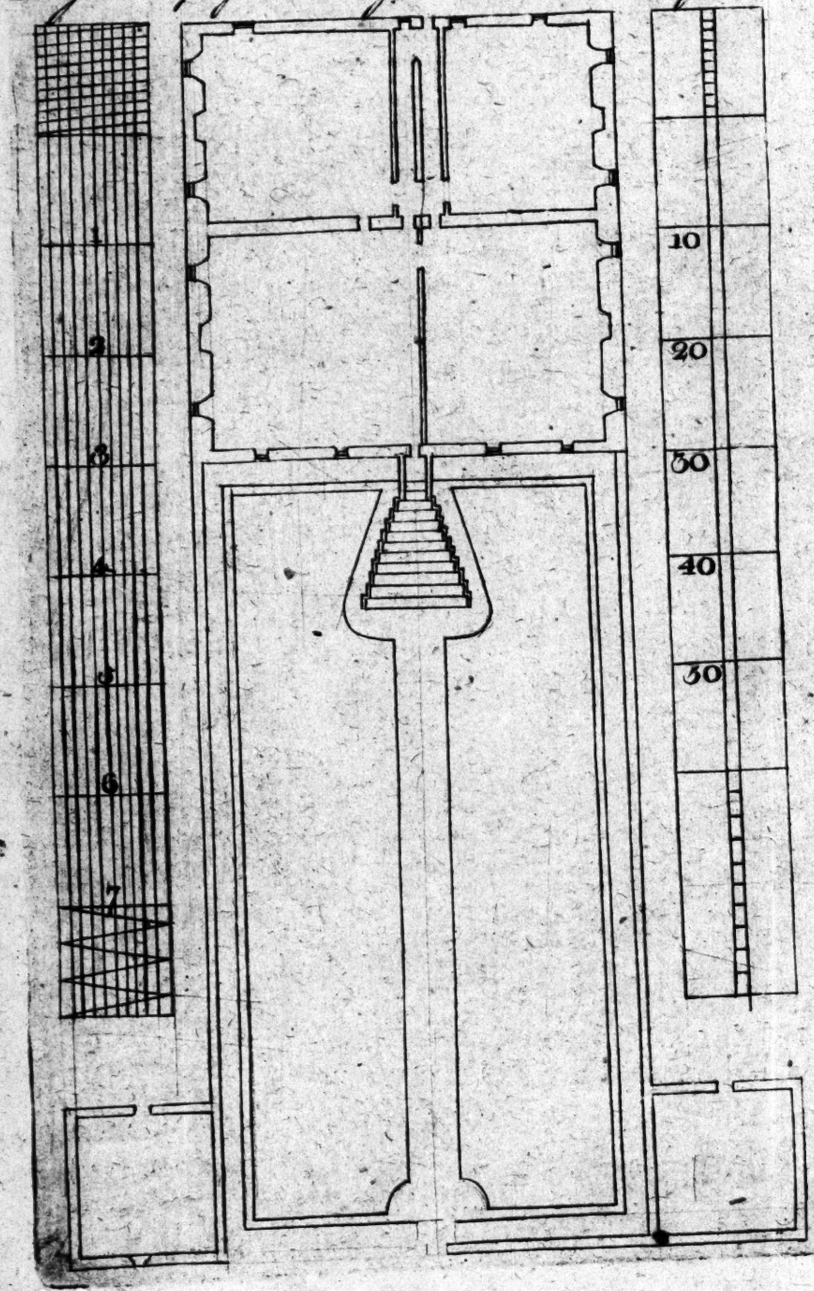

Fig 5 Fig 6 Fig 7 page 2

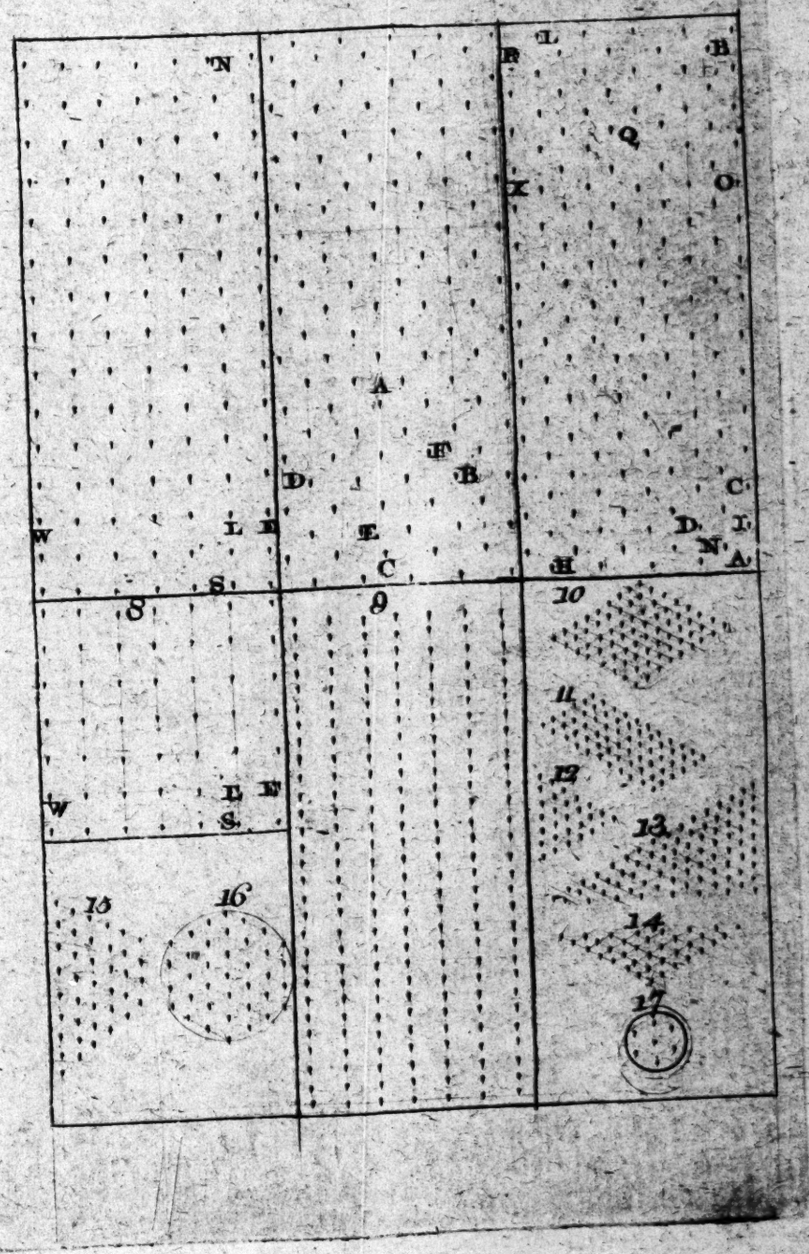

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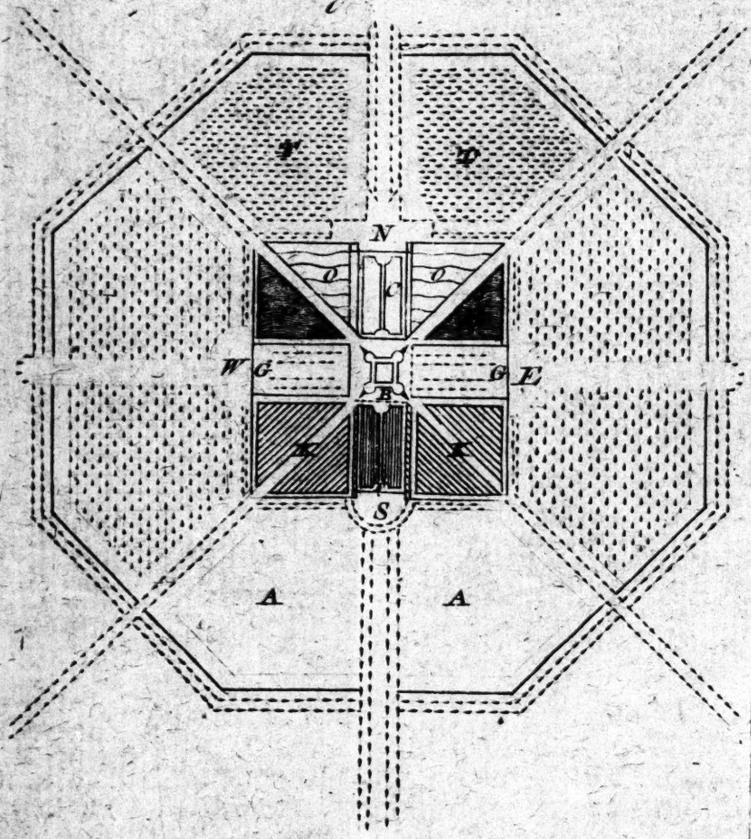
Fig. 2.



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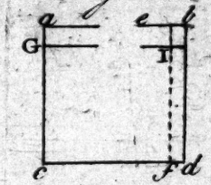
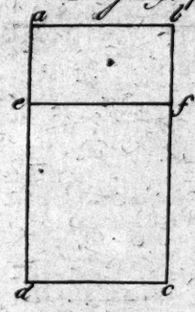


Fig. 19. page 34



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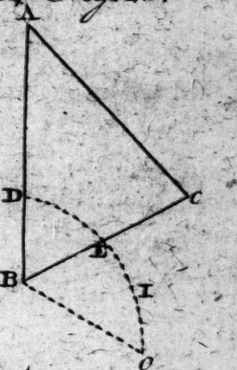

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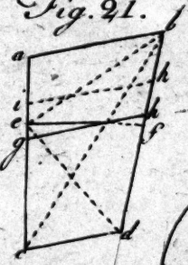

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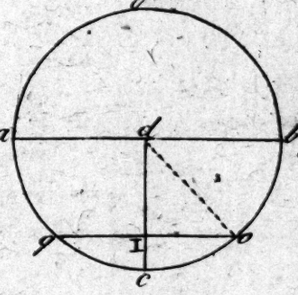
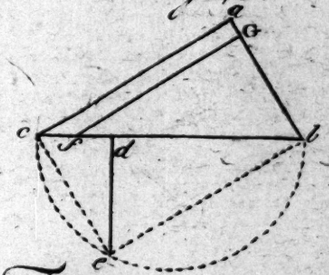


Fig. 23.

Fig. 24.

Fig. 25.



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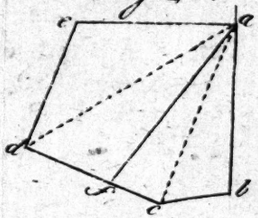
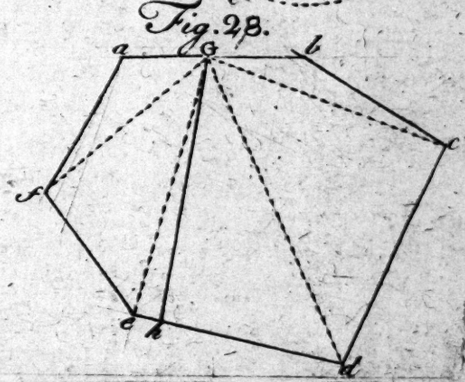


Fig. 27.

Fig. 28.



ter, at B: round the houſe are balliſters: the common avenue is N, and ends in a triangle: C is the outer court; and in the two triangular courts marked O, are placed the office-houſes, with their back part to the court, C, opening without the line of the houſe. The two plots P, may be ponds; the two marked G, cherry-gardens; a proper place alſo for raiſing gooſberries, currants and ſtrawberries. On the ſouth ſide of the houſe, there is the pleaſure or flower-garden, called the Parterre; on each ſide whereof ly the Kitchen-gardens, marked K; from thence there runs another walk ending in a ſemi-circle, S, which leads out to the lawn or deer-park. The viſtas, or walks of proſpect, that run from the four angles of the houſe, are very pleaſant and convenient, and afford a good ſhelter and protection from rain: for which cauſe there are two thickets on the north ſide, marked T; on the ſouth ſide are two ſuch, marked A, for nurſeries; and at eaſt and weſt are two orchards. The whole is environed with two rows of forreſt trees without the wall: The park-wall ſhould be parallel to theſe, that is, every where equi-diſtant from the houſe as its center; at leaſt the whole an octagon, or near to a regular polygon, conſiſting of equal ſides and angles. The walks with their fences, being run forward from all the four ſides and four angles of the houſe, till they touch at the middle of each ſide of the park-wall, ſerve in the park for diviſors; which diviſors may be hawthorn hedges, and theſe in the gardens holly; but in the court-entry and office-courts, I think walls requiſite. There ſhould alſo be an aſcent to the houſe, if poſſible; as, at the firſt court-gate two ſteps: at the ſecond four ſteps, &c. But leaving it to every man to plan as his ground and ability will beſt admit, I come to ſpeak of regularity, where confined by the ſituation of the ground.

V. As it requires great ingenuity to lay down and execute a regular plan amidſt the confinements of ſituation; it is no leſs difficult to preſcribe rules for ſurmounting theſe obſtacles, there being ſuch a variety of irregular places, which it is hardly poſſible to correct by precepts. Therefore, to what I have ſaid above of the center and central-line, I ſhall only add one ſingle inſtance.

In a confined ſituation of ground, I add what I can, but diminiſh nothing: I take a ſurvey of the works, and when I find ſeveral regular and irregular things done on one ſide of the houſe, and nothing correſpondent on the other, I mark out the very ſame on the oppoſite ſide: and this I continue to do, till two irregularities produce one uniformity. Or, ſhould an avenue lead obliquely to the houſe, on account of a precipice on the weſt, I immediately view the ground from the top of the houſe, and find that, by turning my face towards the eaſt, I ſhall have ſtately avenues, with gardens on each hand at pleaſure.

But, in order to diſcover and correct the faults of the ſituation, it will be neceſſary to make a draught of the place upon paper; therefore to aſſiſt you in making your works regular, I ſhall ſhew you in the following chapter:

CHAP. II.

How to draw by the Scale.

SECT. I.

ALL Plans not drawn by the ſcale, are but meer ſuppoſitions and ſtrokes at random. If drawn by the ſcale, they ſtand exactly upon paper as if on the ground. Therefore, in contriving your plans, it will be of ſingular

lar advantage to have an eye to the conſequences of all your undertakings, leſt you run inadvertently into a ſnare: for after you have fixed on your deſign, and perhaps gone a great length in your work; yet in the courſe of your procedure, one thing making way for another, you may chance to hit upon a far better method, to accompliſh which you muſt overturn moſt or all that you have done, and thus run yourſelf into unneceſſary expence, or, in order to ſave it, muſt ſit down with a diſatisfied mind. All theſe inconveniences may be eaſily and timeouſly prevented by projecting your plans upon paper.

II. You may make as many ſcales as you think neceſſary; ſo that, when you have a plan to draw, you may find arithmetically which of theſe ſcales you ought to draw it by. In the firſt place make a thin broad rule, two foot long, of pear or apple-tree, plumb-tree, plane-tree, boxwood or braſs, which laſt I prefer. Draw as many lines on both ſides as it will contain. The diagonal ſcale is the moſt uſeful, as in fig. 3. It is made by dividing the inch into ſo many equal parts, as in 8, 30, 100, 200. By the help of the figure and multiplication you can compute the extent of 5 diviſions, drawn the length of the ſcale, and 7 in the inch. The other way is a ſcale of 35 in the inch, which is 5 by 7, *&c.* If your rule be two foot, you may have two lengths on it, or as far as your largeſt compaſſes can conveniently extend. You may likewiſe make ſome of the common ſcales, *i. e.* by dividing the inch in the ordinary way, in a ſtraight line, into ſo many equal parts, as in fig. 4. ſeeing diagonals are only computed by multiplication.

III. If you are to draw a plan, but know not how to take your meaſures from the ſcale; if you know the meaſures on the ground, take as many from off the ſcale with your compaſſes, as you have feet, ells or falls, and extend theſe on the paper. For example,

if you were to draw an orchard, whoſe length is 680 ells, by a ſcale of 200 in the inch, as in the upper part of fig. 3. you are firſt to conſider how oft you find 200 in 680, that you may meaſure ſo many whole inches with your compaſſes, and the fraction or remainder you can take off from the ſubdivided inch. If you fix one foot of the compaſſes at 6, and extend the other to *a*, theſe ſix half inches amount to 600; and eight diviſions marked off on the ſubdivided half inch make 80, both which you may place on the paper and draw accordingly. Example 2. By the other ſcale containing 100 in the inch, ſhould you incline to mark the breadth of a walk of 23 foot on paper; as it does not extend to one inch, you muſt therefore take only a certain part of an inch; extend your compaſſes from *a*, at the end of the ſubdivided half inch, to *o*, and you have it; then go to work as before. You may obſerve that the 23 diviſions on the ſcale, is the three from twenty forward on the line betwixt 20 and 30. If your draught be ſo large that your compaſſes cannot reach its length, then divide the ſame by 2, 3, or 4, &c. take the quotient on your compaſſes, and mark off ſo many times as your diviſion conſiſted of. This is ſo plain that it needs no example.

IV. But if you are to make a draught on one or more ſheets of paper, then take the length of your paper in inches; by which divide the length of your ground, whether in feet, ells, &c. and the quotient will give the ſcale you muſt draw by; *i. e.* an inch divided into ſo many equal parts. For example, if you have a plot 360 foot long, which you intend to draw on a ſheet of common paper of 16 inches: or, not to extend it the whole breadth of the paper, ſuppoſe it 15 inches; 360, the length of the ground, divided by 15, the length of the paper, gives 24; therefore draw it by a ſcale divided by 24 in the inch. Example

ample 2. If you design to draw a field, the breadth of which is 864 falls, on the eighth of a sheet, *viz.* 3 inches; divide 864 by 3, the quotient is 288; but this being too small, take one half of it, *viz.* 144, and draw it by that proportion; always remembering that each division on your paper is two falls on ground.

V. Or if you have a draught, and know not by what scale it was drawn, but know what ground it contains; the work is, first to measure it by a supposed scale; and secondly, to find a mean proportional betwixt the true quantity of acres, and that quantity found by the supposed scale; and thirdly, by the golden rule, say, as the quantity of acres found by the supposed scale, is to the mean proportional; so is the supposed scale, to the true scale. For example, If you have a plot of ground containing 72 acres, and you measure it by a scale of 18 falls in the inch, which makes but forty, one half acres; the question is, What scale was it drawn by? you will find the mean proportional betwixt 40. 5. and 72, to be 54, as in Chap. VIII. Sect. VI. and as 40. 5. is to 54; so is 18, to 24. Thus it appears that the said plot was drawn by a scale of 24 falls in the inch. Example 2. If you have a plot containing 14 acres, 64 falls, which, measured by a scale of 40 in the inch, makes 90 acres, What scale was it drawn by? You will find the mean betwixt 14. 4. and 90, to be 36; therefore as 90, the acres found by the supposed scale, is to 36, the mean proportional; so is 40, the supposed scale, to 16, the true scale. This shows that it was drawn by a scale of 16 in the inch.

VI. But if you have a draught, and know not what scale it was drawn by, nor what ground it contains, so as thereby you might find its scale, and you desire to diminish or enlarge the same on paper, and yet that it may retain the same shape and proportion in every respect; you may divide or multiply every particular line

line or part of it, as if you would have it one third leſs; then divide each part by 3, and mark one of theſe on the paper. Or if you would have it twice as large, then double every part of it; that is, take the double of each length and breadth on the compaſſes, and ſet on the paper, and draw accordingly. But if your draught be a map, or the like, draw a ſquare by the outer-edge thereof, and divide each ſide into as many equal parts as you think fit; betwixt which draw parallel lines all through, croſſing from oppoſite ſides, and notice what part of your draught falls within the precinct of each little ſquare; and ſo copy it upon another paper, whether larger or leſſer; as, if you would have it one fifth leſs, take one fifth of the ſide of one of the little ſquares, and therewith ſquare your clean paper: and likewiſe take one fifth of length and breadth of each particular within each little ſquare, and one fifth of the ſpace that ſuch and ſuch parts, creeks and angles, are diſtant from any two of the angles of the ſame; and ſo place them accordingly in the leſſer little ſquares of your clean paper.

VII. When you deſign to ſurvey any plot of ground, be careful in meaſuring the diſtances truly, and keep an exact accompt thereof. You may make firſt a ſuppoſed figure on paper, before you begin, that thereon you may write your meaſures as you go along: ſuppoſe it to be a Hexagon, ſee fig. 27. draw a figure at random containing ſix ſides; and having obſerved the meridian on the ground, which you may either find by the compaſſes, or let the central line of the houſe, its perpendiculars or parallels, ſerve in place thereof; mark down ſuch on your ſuppoſed figure: then let the two men with the chain begin at any angle; the firſt may have ten ſmall ſticks to thruſt in at every length of the chain, and let the laſt man gather them up as he comes along; and when all are taken up, let him give them

to

to his aſſiſtant to begin again as before, calling that one change; ſtill being careful to go ſtraight betwixt the two ends or extreams: and when you come to the other end, count how many changes, chains and links; ſuppoſing the hedge *c d* to be 70 falls, write that down as in the figure, and ſo proceed to the reſt, obſerving the ſame method.

VIII. But when you meaſure round any plot or field, you muſt know how to find the quantity of the angles, and protract the ſame; for this I ſhall ſhew you the moſt exact and mechanical method: for example, fig. 21. when you have meaſured the length of the four ſides of this Trapezium, as is taught, then meaſure alſo betwixt any of the two oppoſite angles, as from *c* to *b*, or from *d* to *a*, and then you may protract it only with your ſcale, thus; draw a given line on the paper, as *a c*, and from your ſcale take ſo many diviſions as were the length of the hedge, *a c*, and ſet thereon; and take the length betwixt *c* and *b* on your compaſſes; ſet one foot in *c*, and deſcribe an obſcure arch at *b*; alſo take the length of *a b*, and, ſetting one foot in *a*, make another arch to croſs the former at *b*; then draw the line *a b*: likeways take the length of the ſide *b d* on the compaſſes; ſet one foot in *b*, deſcribe an obſcure arch at *d*, and take the length *c d*; and, with one foot in *c*, croſs the former at *d*; then draw *c d* and *b d*, and ſo have you finiſhed. By the ſame rule it is eaſy to protract fig. 26 and 27, or any other; and this is my method of ſurveying.

IX. As for the dimenſions of circles, ſee chap. VIII. For, having the Radius, you may eaſily find all things belonging to that operation.

As for ſtraight-lined figures, if you reduce them into triangles, and meaſure the three ſides of each, you may protract them, as is taught: thus Trigonometry, or the doctrine of plain triangles, ſhews, that having any three

three things in a triangle, we may find the other three, either by the ſcale or by artificial Sines, Tangents and Logarithms; as having three ſides, or three angles, or one angle and two ſides, or two ſides and one angle, &c. Example, in fig. 20. ſuppoſe you would have the diſtance between B and A. Firſt meaſure off from B, at any ſide moſt convenient, ſo many ells or falls; the more the better: ſuppoſe 384 falls to C, as will appear by a ſcale of 400 in the inch; and in ſetting it off, notice what degrees that angle makes by your protractor; then hold the ſame at C, with its chord-line on B C; turn the index, till it point to A; mark what degrees it cuts, ſuppoſe 80, and write them down; here you have the ſide B C 384, the angle A B C 60, and the angle B C A 80, and of conſequence the angle being its complement to 180: therefore go to your paper, and draw a given line, as A B, then open the compaſſes to the Radius of your line of chords, and therewith, ſetting one foot in B, deſcribe the arch D E I O; likewiſe take 60 degrees with your compaſſes off the line of chords, ſet from D to E on that arch-line, and by the point B and E, draw the line B E C; ſo ſhall the angle A B C contain 60 degrees: but if the angle happen to be more than 90 degrees, then you may take it at twice, ſeeing the ordinary line of chords has but 90; as if the index had cut 120, firſt take 90 upon the compaſſes, and ſet from D to I, then take 30, and ſet from I to O, which angle A B O contains 120 degrees. But to return, as you ſet off the angle at B, ſo likewiſe at the angle C make an arch, and ſet off 80 degrees thereon, thro' which point at C draw the line C A; laſtly, take the line B A on your compaſſes, *i. e.* betwixt the point B and the point at A, where the line C A cuts the line B A, and apply to the ſame ſcale of 400 in the inch, from whence you took the 384, and you will

l find the distance betwixt B and A to be 588 falls:

the sign of the angle B A C,	
of 40 degrees, - - - - -	9,808,067
o the Logarithm of the side B C,	
84 falls: - - - - -	584,331
is the sign of the angle B C A,	
f 80 degrees, - - - - -	9,993,351
sum of the 2d and 3d added, -	10,577,682
first number to be substracted	
rom this sum, - - -	9,808,067
the Logarithm of the side A B,	
88 falls, - - - - -	769,615

f you would know how to find the superficial con- of any plot of ground, or how to divide the same; o lay out any quantity of land in any form what-, see chap. VIII.

CHAP. III.

How to make Avenues and Walks.

SECT. I.

LL Walks should front the gates or entries, whe- ther they lead to a house, garden, gate, door, , wood or high-way. When you have determi- on the end of your walk, in the middle of the se-front set off a perpendicular to find the central , as observed in fig 2. and for your more exact per- nance, prepare the following instrument, *viz.* take straight rules of three or four foot long; join them s one another, so that the four angles where they may be right angles; at each end of these fix a straight

ſtraight piece of wood, of about four or five inches; and exactly in the center of each of theſe pieces, make a ſlit or hole quite thro', and in theſe put a piece of ſmall ſilk-threed; place the croſs on the top of the three footed-ſtaff, with a plummet, whereby you may plant it horizontally upon occaſion: on this likeways place your protractor, with the box and needle when you intend to ſurvey ground.

As to the avenue, ſet one ſide of your croſs parallel to the given line, the houſe-wall; this you may do with great eaſe, by taking one end of it within the door, till the ſide touch the door-poſts; and you may alſo view acroſs by the ſide-wall, backſight and foreſight, till it ſtand exactly parallel thereto: then turn, and ſtanding within the door, view ſtraight out by the ſilk threeds, and ſo direct one to drive ſtakes all along as far as you can ſee, in a ſtraight and perpendicular line. You may alſo find this perpendicular central line, tho' walls, hedges, houſes, trees, *&c.* obſtruct your view, if you can ſee over them from any window, or off the battlement, if there is any; otherwiſe recur to the rules in § III. and IV.

And as by this inſtrument you may raiſe any perpendicular; ſo by the ſame you may let a perpendicular fall: for you may alter it as you pleaſe upon the given line, till it direct to the angle or point aſſigned.

II. The central line of your avenue being found out, you muſt place your croſs upon it, and thereby ſet off half the breadth of it at each ſide; do this at both ends and middle, that they may be exactly parallel, and therein drive ſtakes almoſt to the head. And when you come to mark out for the trees, in order to plant them, ſet a ſtraight pole at each driven ſtake for your direction in going ſtraight betwixt them.

If

If the length of the walk be confined, divide it by the diſtance you intend to plant at; and if there be any odds, add or ſubtract till all the diſtances are equal; which diſtance you muſt take on a chain; for a line will ſtretch or ſhrink: begin at one end, and go ſtraight to the other, thruſting in a ſmall ſtake at each length; minding to let both rows go on parallel to one another, that is, one on each ſide; ſee the Avenues of fig. 2.

And tho' the ground be unequal, yet you muſt hold the chain level; wherefore you muſt have a ſquare and plumb fixed at your pole or ſtaff, for your more exact performance of the operation.

When you have ſtaked out the ground, prepare the rounding-ſtring, *viz.* a piece of line doubled, and tied near the point of a ſtick, and ſo put the double on the ſtakes where the trees muſt ſtand; and ſtretching the ſame, make a ſcratch with the point of the ſtick round, and, with a ſpade, follow that circle, and dig the hole. See the Second Part of this Treatiſe, where there are directions how to prepare the ground and plant.

If you obſerve theſe directions, having found one line, you may mark out any kind of walk: I ſhall now ſhew you how to find one line, whatever obſtruct.

III. And firſt, ſuppoſe you would run a line or walk through a wood; when you have concluded on the end of it, there erect a perpendicular as above, and run it as far into the wood as you can; then at each ſide thereof ſet off a parallel line, two or three foot from the central line, or half the breadth of the intended walk; ſo ſhall you have three parallel lines running on in ſtraight lines together. And where any one runs on a tree, run forward the other two, and ſet it off again, as it was, parallel to its fellows; and ſo proceed till you paſs thro' the wood or thickets, ſtill marking the trees that fall in the interval to be cut down.

A ſecond way is by means of lanthorns with burning candles, in a calm night when dark, hung on ſtakes: while you are ſtanding in the wood, you may plant ſtakes at pleaſure, letting the candles fartheſt from you be higheſt, and removing forward the lights as need requires.

IV. But if both ends of your walk be determined, and you cannot ſee betwixt, by reaſon of hills, woods, houſes, or ſome ſuch obſtruction; in ſuch a caſe let two, having each a pole, go to the center, or to a place betwixt, where they may, by looking backſight and foreſight, perceive the two extremes: there ſhould be a pole with white paper on the ſlip-boards to make them the more conſpicuous: turn your faces towards each other, ſtanding at a large diſtance aſunder, but ſo as you may both ſee your reſpective objects: let A direct B to ſet the pole in a line with his, and that at the north-end; and B direct A to hold in a line with his, and that at the ſouth-end; ſo each directing the other by words or ſigns, let both ſhift to and fro', till they have their deſires at once; then ſhall theſe two, and the extremes, be all four in a ſtraight line, whereby you may ſet as many as you pleaſe. This way I found out by experiment, and think it worthy a place amongſt the Mathematicks.

But if you cannot ſee the two ends, when ſtanding in the middle, altho' the poles be ever ſo high, then, if it be wood or hedges, the foreſaid lanthorns and candles will do the buſineſs.

But if the obſtructions be hills, walls or houſes, which intercept your view, ſo as you cannot ſee, either by lanthorns, or high poles, tho' ſtanding in the center, then work by parallels thus; ſet off a parallel line ſo far, as that it may run quite beyond the obſtruction, on the ſide moſt convenient; then ſet in the parallel

parallel again at convenient places; ſo ſhall both agree, as will appear when the obſtruction is removed.

But if none of theſe will do, run a line over by gueſs, and if it miſs, take notice of your error at the end, by letting a perpendicular fall on the determined point, by means of the ſquare or croſs, and the meaſure betwixt diſcovers the error: then meaſure the length of your intended walk or line, and, at the quarter thereof, ſet off the fourth of your error; at the middle the half; and at the three fourths of the length, ſet of the three fourths of your error; this will lead you ſtraight to your purpoſe.

Trigonometry will alſo ſolve this, if you could work exactly; for here you have two ſides and one angle given you.

V. If you have a given line, and deſire to ſet off a parallel from it; but cannot meaſure off freely at both ends, there being trees, waters, hills, walls or houſes, obſtructing; you may meaſure, ſquare or perpendicular off at any part of the given line, ſo far as you intend to go with your parallel; at, or upon which point, erect another perpendicular to run backſight and foreſight, which ſhall be exactly parallel to the given line as was required.

VI. Tho' I have given ſome directions for ſtaking out walks for planting, yet as your avenues and walks muſt end in ſome figure or other, whether triangular, circular, oval, *&c.* for coaches and carts to turn in, as alſo where walks meet or croſs one another, it is requiſite that there ſhould be an example laid down for that reaſon.

How avenues may end in ſemicircles and triangles. See fig. 2. If an avenue ends in a ſemicircle, it may begin with the ſame, or rather, if the ground will ſuffer, it ſhould begin with a whole circle, having four oppoſite opens the breadth of the walk. If it ends with

a triangle, it may begin ſo likewiſe; but rather with a ſquare, whoſe entries or opens muſt be in its angles, and alſo where the walks meet or croſs one another. You ought to lay down a plan of your avenue, but ſo as the trees in the whole may be every way lineal, except in the ſegment of a circle, where they deviate a little. The figures ſhould be at leaſt three times the breadth of the walk, but ſo as the ground will admit. Let not the trees in the figure ſtand much above half the diſtance of thoſe in the walk, but divide equally; make the breadth of the walk in proportion to its length. I think an avenue a mile in length, may be 40 ells in breadth, ſee chap. V. § II. Neither ſhort broad, nor long narrow walks are handſome, except in the caſe of walks of ſhade, and alſo of avenues, where the front of the houſe, jaumbs, courts or pavilions, are to be humoured; for the breadth of the court ſhould be at leaſt the whole length of the houſe-front; and if there are two wings, the middle-walk of the avenue may be the breadth betwixt; and the ſide-walks the breadth of the wings: or the mid-walk may extend the breadth of the whole front, and the ſide-walks the breadth of the pavilions which are on the corners of the court: or you may divide the houſe-front in three, making the middle-walk the exact breadth of both the ſide ones, ſo ſhall they be every way lineal; but do not maſk a fine front, nor vail a pleaſant proſpect. The length of the avenue ſhould extend ſo far, as that, when ſtanding at the houſe, you may loſe ſight of the utmoſt end. When it runs over a brae, then to the eye it appears infinite; and where that cannot be had, it doth very well where the ſight terminates in a Grove or Circle of Firs.

VII. The diſtance of trees is, ſometimes according to the quality of the ground, or trees to be planted; ſometimes to the number of rows, or as the figure to

be planted will beſt admit. If in a good ſoil, plant at the wider diſtance: if four rows, as in an avenue, plant at 5, 6, 7, or 8 ells diſtance: if two ſingle rows, at 4, 5, or 6 ells: if circular figures, or the like, at 2, 3, or 4 ells, or as the Figure is ſmall or great: and plant ſo as they may ſhew the figure to advantage.

Some trees require a wider diſtance than others; and of conſequence, theſe that take the greateſt growth, muſt have the largeſt diſtance aſſigned them. See the next chapter § 10.

N. B. To prevent your intermixing great with ſmall trees, or quick growths with ſlow ones, in the courſe of planting, ſee part II. chap. IV.

CHAP. IV.

How to plant Thickets and Orchards.

SECT. I.

AS the ground where you plant muſt be incloſed, ſo muſt the trees ſtand at ſome diſtance from the fence: if it be a wall whereon are wall-trees, let the ſtandards be at leaſt four of their own diſtances from the ſame, that the ſun may not be kept off the wall by the height of the trees; and if you deſign fine walks round the wall, plant the row next to it with dwarf-trees, or ſome low hedge, and the trees thirty feet from theſe: If the incloſure be a hedge, obſerve the ſame rule; alſo let the trees be parallel to the incloſure: but every plot will not bear to be planted every way lineal, and at the ſame time ſtand parallel to the incloſure: Therefore it will be neceſſary, firſt, to enquire a little, what figures they are that may thus be planted; ſecondly, How to plant ſuch as will not admit of this order: And laſtly, How to plant theſe ſeveral ways.

II. The figures that may be planted every way in

row, are many; yet, for brevity's ſake, I ſhall mention but few, as oblong and geometrical ſquares, ſee fig. 5, 6, 7, 8, 9: rhombus, ſee fig. 10: rhomboides, ſee fig. 11: oxigon or equilateral triangle, ſee fig. 12: orthygon or right angled triangle, ſee fig. 13: ambligon or triangle, with one obtuſe and two acute angles, ſee fig. 14: a ſort of trapezium, ſee fig. 15: hexagon, ſee fig. 16: octagon, as the whole of fig. 2. Theſe regular polygons are the neareſt way for planting a circle.

Many more figures there are, both regular and irregular, that will admit of this order; but theſe may ſuffice for illuſtration. As for theſe that will not, you may plant them parallel to as many ſides as you can, and let the reſt fall as they will.

III. Now, there are but three principal ways of planting every way lineal, altho' there be more built on theſe, *viz.* ſquare, rhombus and triangle. In the firſt, three of them make a right triangle, and four of them deſcribe a circle, ſee fig. 5. In the ſecond, three of them make a triacute triangle, and four of them deſcribe an elipſis, ſee fig. 6. But this way will admit of variation. In the third, three of them make an equilateral triangle, and four of them deſcribe an oval, fig. 7. and ſeven of them make a circle with a center, fig. 17.

III. The manner of planting the firſt, which is the common way, is exemplified in fig. 5. Take the length of one ſide, and divide by the diſtance you intend to plant at, and the quotient tells how many; and the remainder, if there be any, you may proportion as before. Then, with your determined diſtance on a chain, begin at a corner and go round the out-line exactly, thruſting in a ſtake at every length, where the outer-row muſt ſtand; theſe keeping in a ſtraight line, and at equal diſtances, alſo upright and perpendicular. The way is thus; one muſt ſtand at weſt, and view to eaſt; another at ſouth, and view to north, cauſing a third

ſet

ſet a ſtake in line with both, as at L: ſo, removing from ſtake to ſtake, viewing ſtill to the oppoſite, direct the third by words or ſigns, till his ſtake be in a line with both. Thus proceed, till all the plot be ſtaked out the way the trees ſhould ſtand when planted; as at fig. 5.

But if the ground be unequal, cauſe the ſtake-ſetter hold up a long ſtraight pole, with a plumb-rule for holding it perpendicular, and when he removes, thruſt a ſtake exactly where the pole ſtood; but if the pole will not do, let the viewers mount them on three footed, or ſtanding ladders; and if that will not do, betake yourſelf to the rule, mentioned in the laſt chapter, for taking a line over a hill, where both ends are confined, as I have done in the like caſe.

But becauſe ſome ſcarcely know ſignals, the ſtake-ſetter muſt be told, that, when the viewer ſtands with his face northwards, and waves his right hand eaſtward, he muſt go a little eaſtward with his pole; and when he waves the left, then weſtward; when both his hands point at once eaſt or weſt, then he muſt hold the head of the pole ſo, if he have no plumb for his direction; but when the viewer moves both hands, or hat, up and down, then the ſtake-ſetter muſt fix there.

V. If you plant the ſecond way in a ſquare, where the out-line round is not at equal diſtances, tho' the oppoſite ſides are; here, in this example, one ſide is about twelve and one half ell's diſtance, and the other fifteen, and the view being angular, and not from oppoſite ſides, makes the trees ſtand at about ten and one half ells.

But if you will plant rhombuſoically, then 'tis done by the equal diviſion of its four ſides, and by viewing its oppoſites, as is repreſented by the rhombus A B C D, in fig. 6; for tho' its angles be not ſquare, nor equal, yet its ſides muſt be equal, and angles oppoſite:

And

And here it may be varied according to the ſhape of the ground, by ſtretching longer, or opening wider: A C is its breadth, and D B its length. Or you may alſo plant by the rhomboides, as in D A F E, and conſequently many more figures may be planted thereby, as well as theſe varied or altered, and yet the whole continue in a regular order.

VI. In the third way, take an example in figure 7. where the length of one ſide muſt be divided by the determined diſtance, *viz.* the diſtance of the fence being ſubtracted, the length of the ſide A B is 119, and I deſign to plant at eight and an half ells; therefore I divide 119, by 8, 5 decimally; the product is 14 diſtances; then there will be 15 rows: here one ſide is ſtaked out, whereby you may plant the whole plot thus; take two diſtances on the chain, that is, hold one end exactly at A and the other at C. Again, with that meaſure on the chain, hold one end at the firſt ſtake, A, and the other at the ſecond, I; cauſe a third take the chain exactly by the middle, and, holding it ſtiff, thruſt in a ſtraight ſtake at the angle of the chain, N; ſo theſe three make an equilateral triangle: then remove, holding one end at the ſecond ſtake, I, and the other at the third, C; ſtretch the chain and thruſt in a ſtake at its angle or middle as before. Thus you may proceed from ſtake to ſtake till that row be planted: and ſo on from row to row, till the whole plot be ſtaked out. Remember to ſet the ſtakes ſtraight and perpendicular, and alſo to conſider their thickneſs; in all which if you be not very exact, you cannot avoid error, before you come on the other ſide. Therefore I ſhall ſhew you another way, which is more ſure and exact, and coſts leſs pains, *viz.* firſt let that one ſide be marked out as before, and having ſet two or three ſtakes of the ſecond row, as is juſt now taught, then upon two, hold to the chain, and plant another ſtake to begin a third row, as at D; then take the

exact

exact distance betwixt L and D on the chain, and therewith stake out the side B R; and because there is one old row, take the exact half of that distance by doubling the chain, and set from R to L; then with the whole length go betwixt B L, thrusting in a stake at each length; and here you shall find three distances, and the half that was set off at the angle R. Thus two sides are staked out; and whoever can do this, can also stake out the other two, seeing the opposite sides are answerable: for as A B is to H L so is L B to H A.

When the plot is staked out round, let one stand at X, fronting B, and another at O, fronting R; cause a third set a stake in line with both, as at Q. Thus you may proceed from stake to stake, till all the plot be marked out, still minding the way of your viewing.

A plot will contain more trees this way, than by any other method. The two plots, fig. 5. and 7. are both alike in shape and quantity, each containing one acre, two roods, sixteen falls, thirty ells; and fig. 7. holds eleven trees more than fig. 5. planted at one and the same distance.

VII. A fourth way of planting, is that which is ordinarly used in thickets, fig. 8. for when the trees grow large, every other row, especially the short ones, may be taken out, that the rest may have freedom, and so be benefited by the Sun and air; thus one fruit-tree at large, will bear more than four crouded ones, and yet continue in as good order; and will answer, in some measure, the expectations of those who complain, while their orchards are young, of their having few fruit, seeing the more trees they have, the more fruit is to be expected; therefore, when their branches begin to meet, they ought to remove them, lop and plant them by their hedges, I mean by the divisors of their corn-land, and the trees, being now full grown, are able to defend themselves. This is also applicable

to

to forreſt-trees, ſeeing, while they are young, they afford little ſhelter, except they are more than ordinary thick; and yet, when they grow up, cannot arrive at that ſtatelineſs and magnitude you would deſire, unleſs the ſame care is uſed. *viz.* the removal of each ſecond row, which may be effectually planted about the borders of your corn-land, meadow and paſture; which now needs no fence, except a few thorns ſtuck about to keep the cattle from rubbing. In orchards, if the ſhort rows be cherries and plumbs, they not being long-lived, will be paſt their prime before the apples and pears, which may be in the long rows, require their room from them.

The method is this; you muſt mark out the plot round about, and view from angle to angle of each geometrical ſquare: but then the diſtance of the outer-row muſt be greater than in the firſt method; otherways the trees will ſtand much nearer; as 7 is to 5; ſo is the diſtance of the outer-row round, to the diſtance of the trees through the plot.

Or you may plant it by viewing from oppoſite ſides; only you muſt plant the out-line of ſtakes round about, at half the former diſtance, and let the ſtake-ſetter paſs by every other diſtance; except you intend to plant gooſberries and currant-ſtandards in theſe blanks, and then the trees and ſhrubs together ſtand as in the firſt method: and now the proportion is, as 7 is to 10; ſo is the diſtance of the outer-row round, to the diſtance of the trees: or as 10 is to 7; ſo is the diſtance of the trees to the diſtance of the outer-row round. Such proportion doth the ſide and diagonal of a geometrical ſquare bear the one to the other, and abundantly exact for our purpoſe.

VIII. The fifth way is, and a very fine one, where orchard and kitchen-garden are all one; or where you have corn or graſs amongſt your trees; or trees, whether

ther barren or fruitful, among your corn or graſs, ſee fig. 9.

If for a kitchen-garden, divide it in ridges, making the tables or paths in the middle of the wideſt interval; and then ſubdivide it ſo as the trees may fall in the middle of the beds or borders. If for corn-land, the ridge muſt be between each row, plowed within four foot on each ſide the rows or ranges of trees; which eight foot borders muſt be delved each ſpring; or, if ſtiff clay at both equinoxes, and no vegitable ſuffered to grow thereon: for a man, or two, with large hows, 10 inches broad, will quickly go through them in ſummer, and cut the weeds at their firſt peeping; this would certainly be a great improvement: and whether you apply to corn or graſs, fruit or forreſt-trees, I would adviſe you to keep them thus clean of weeds.

IX. A ſixth way of planting trees, is, to make all the walks or intervals open from the houſe proportionally, ſo as, when you ſtand at the houſe, the walks may appear all of an equal breadth to the eye; this would ſuit well my plan of the houſe, being like the ſun ſending forth his beams.

X. The diſtance of trees in thickets and orchards, is either according to the quality of the ground, trees to be planted, or method of planting.

If in a good and deep ſoil, there trees will live long, grow to a great magnitude, and require a large diſtance. Apples planted the firſt, ſecond and third way, may be from eight to ten ells diſtance. Pears ſo planted, at ten, or twelve ells: and of theſe planted the fourth way, may be at the leaſt diſtance mentioned; becauſe they will ſtand near the greateſt, when every ſecond is removed: but if planted the fifth way, they may be from ſixteen to twenty ells one way, and from eight to ten the other. Cherries and plumbs from five

to

to seven ells, being planted the first, second, third or fourth way. As for the distance of dwarfs and wall-trees, see the next chapter, § V.

At the same distance with pears, plant oak, elm, ash, plane, beech, walnut, chesnut: with apples, plant greens, serviee, poplars. At the distance of plums and cherry, plant maple, horn-beam, hazel, birch, laburnum, asp, alder, willows, pine, fir, yew. For further directions, see the last chapter, § VII.

If the ground be level, plant such trees as grow lowest at the south side, and still higher by degrees towards the north, that the tallest and strongest may be on the north side; so shall the northern blasts be guarded against, and the sun-beams the better received amongst them. If the ground be not level, plant such as grow low on the highest ground, and the contrary. And set always the crooked or leaning side towards the south-west, whence come the strongest winds, which in a few years will make them the more erect; for you may observe that all trees that are not well sheltered from these westerly winds, lean or decline towards the east.

When the ground is all marked out with stakes, put on the rounding string, and make the holes: see the last chapter, § VII. I use not to make them less than six foot diameter for ordinary trees; and you may suffer the outer-row of stakes to stand till you plant the rest, that you may view thereby.

How to order the ground for planting and inclosures, see the second part.

CHAP.

CHAP. V.

How to make the Kitchen-Garden.

SECT. I.

OF all gardens the kitchen-garden is the beſt. In every garden it is ordinary, firſt, to make a border at the wall; ſecondly, a walk; and thirdly, a border on the other ſide of the walk: thus the walk, with a border on each ſide of it, ſurrounds the whole plot, parallel to the wall: but if your ground be large enough, I would adviſe you to make a larger diſtance betwixt the walk and the wall. It is alſo ordinary to divide the garden into four plots, by two walks croſſing from ſide to ſide: tho' I do not approve of croſs-walks in gardens; yet if you would have more than one, which divides the whole into two parts, make them all parallel through the plot, leading to the houſe, and equi-diſtant from the middle, ſtill making the gates, doors or entries, front the walks.

In your kitchen-plots, and in nurſeries for trees, plant no trees through the ground: for when they grow up, they cover and choak the ground, ſo that you will be neceſſitate to ſeek for another. Therefore make only three borders next and parallel to the walks around, on each hand; plant the firſt, or that next the walk, on both ſides with a holly-hedge; the ſecond with gooſberries and Currants, and the third with dwarf-trees; keeping the ground all open and void within for kitchen-herbs and roots; which muſt be orderly divided into ridges; and theſe again divided into beds, furrows, and drills, for your more orderly and convenient planting and ſowing.

II, as for the proportion, take care that your walks extend in breadth according to their length, *viz*, a

thouſand foot long, thirty foot broad; five hundred foot long, twenty foot broad; two hundred and fifty in length, fifteen in breadth; and an hundred foot long, ten foot broad.

Make the borders ſix foot broad; the tables or paths betwixt the borders, two foot broad; and theſe betwixt the level ridges, wherein the ground is divided, three foot broad; the beds, ſix foot broad, with foot and half furrows: you may make ſeven of theſe beds in each ridge, and the whole length of the plot all running from the houſe: but if your ground be ſmall, you may make your borders and beds narrower; yet ſtill let the whole plot, ridges, borders and beds, be equally divided, and their areas or edges three inches higher than the furrows or paths, and ſo much higher than the ſide of the walks as the middle of the walk is higher than its ſides; all handſomely clapt up with the rake-head, by a line: and the like order you may obſerve in your ſeminaries and nurſeries of trees; then plant and ſow by lines and drills, both for beauty and uſe.

When you ſet about this, divide the bed, border or ridge, at both ends, into ſo many equal parts, by the help of the long rule and ſmall ſticks; then ſtretch the line from end to end by theſe ſticks, and with the corner of the rule, make a mark by the line, and therein ſet your herbs and plants; and for ſetting of ſeeds, meaſure out, and ſtretch on the line as before, and with the ſetting-ſtick make the holes by the line, not too deep, and therein put the ſeeds. And if you ſow in drills, make a ſcratch, or little ebb furrow, with the point of the ſtick by the line, and therein ſow. If the rows be two foot diſtance, let the firſt be one foot within the edge; if ſix inches aſunder, make them three inches off the edge, and ſo proportionally.

N. B.

N. B. I have told the diſtances of each ſort of kitchen-herbs and fruits, part II. chap. VI. where is intended ſix foot broad beds; but where they are leſs, there muſt be fewer rows.

III. The kitchen-garden may be placed neareſt the ſtables, for the conveniency of wheeling in dung, and out of ſight of the front of the houſe; becauſe of the impropriety of the view, to ſee dung in that garden where the eyes of the perſons in the houſe ſhould be more agreeably entertained, by lawns, avenues, viſtas, and other more agreeable proſpects than dung, which is neceſſary in kitchen-gardens: and when you plant or ſow, place every ſpecies by themſelves, except ſuch mixture as is mentioned, part II. chap. I. §. III. and where you have not a whole ridge, or at leaſt a bed of a kind, you may compleat them with ſuch as are neareſt of growth and continuance: alſo plant ſuch as are of long duration, and ſuch as muſt be yearly renewed, ſeverally, each in ridges or beds by themſelves; the order is to make every ſort oppoſe itſelf. For example, plant perrenials, ſuch as artichoaks, *&c.* by themſelves, that they may not interfere with that ground which is to be wrought up annually for the annual productions of this garden, ſuch as onions, carrots, turnips, leeks, parſnips, *&c.* Perennials are ſuch plants as continue many years in the ground; annuals are ſuch as uſually die immediately after they once bear ſeed, and that is uſually, tho not univerſally, the firſt or ſecond year.

IV. As for phyſical-plots, you may have them in that ridge of the kitchen-garden next the borders: and if you incline to have no other pleaſure-garden, you may have flowers there, and on the borders next the walks alſo: and the ridge or interval betwixt the walk and wall will be excellent for all early, rare and tender plants. You may rank your phyſic-herbs

in tribes and kindreds, planting every tribe by themſelves, and you may alſo place one of each kind in alphabetical order.

N. B. How to order hedges, ſee part II. chap. IV.

V. For walls, bricks are beſt; next to theſe, ſtone and lime; four ells is low enough, five or ſix if you pleaſe.

Make your walls of ſouth aſpect in ſtraight lines, but not in ſemi-circles, which is by ſome moſt erroneouſly practiſed; for there the wind being pent up occaſions ſquirles, and retards the ripening of the fruits there planted; nor ſhould there be any hot-beds nearer the wall than twenty feet, excepting cucumbers in the ground for picklers. The diſtance of wall-trees will inform you what diſtance to make them; as for example, twenty five foot is the diſtance of cherries and plumbs, except ſuch as the May-cherry, which, being dwarfiſh, requires leſs; twenty eight foot for apricocks and peaches, twenty ſix-foot for apples, and twenty for pears. Obſerve never to plant cherries amongſt any other wall or ſtandard-fruit-trees; for no fruit-trees will proſper under the drip of their leaves: beſides, in planting walls, I would chuſe fruit-trees of a kind to be all planted by themſelves.

In ſtraight walls divide equally, and plant none in the corners: meaſure firſt off ſix foot on each ſide the gates or doors, for honey-ſuckles, jeſſamines, *&c.* And whatever be the diſtance of your trees, ſet them half from theſe, as alſo from the corners; except where you make all their heads ply one way: if on a low wall, ſuch may ſtand three foot from the corners, or the honey-ſuckles they lean from, and a whole diſtance from theſe they lean towards. You may plant a gooſberry and currant in the intervals of your wall-trees, while young, and when the trees approach, remove them. Let the roots of your wall-trees ſtand near a foot from the wall, with their heads inclining towards it.

ſt. Wall-trees in orchards, whoſe ſtandards are in the quincunx, ſhould ſtand oppoſite to the middle interval of the ſtandards.

The diſtance of dwarf-ſtandards is ſixteen foot, where there is but one row; and in following this rule of the three borders, they will ſtand juſt ſixteen foot off the hedge, obſerving to plant in the middle of the borders. The diſtance of gooſberries and currants may be ſix foot. But in all your plantings and ſowings divide the ground ſo as each kind may ſtand and grow equally.

To conclude, theſe three borders ſurrounding each ſide of the walks, handſomely made up and planted as aforeſaid, will ſecure the ground within from hurtful winds and colds, and make people keep the walks; doors handſomly paled being on the entries to the hedges, ſo as they may neither hurt you nor themſelves. Alſo the hedges, dwarf-ſtandards, ſhrubs, and wall-trees being well pruned and plied, with the borders and walks kept clean and orderly, will make it look like a garden of pleaſure, and hide all the ruggedneſs that happeneth in kitchen-ground by delving, dunging, turning and overturning throughout the year.

CHAP. VI.

How to make the PLEASURE-GARDEN.

SECT. I.

PLeaſure-gardens are commonly divided into walks and plots, with a border round each plot; and at the corner of each, may be a holly, or ſome ſuch ſhrub, trained up, ſome pyramidical, others ſpherical; the trees and ſhrubs at the wall well ply'd and prun'd, the green thereon cut in ſeveral figures, the walks

laid with gravel, and the plots within with graſs, in ſeveral places whereof may be flower-pots; the borders boxed, and planted with variety of fine flowers orderly intermixt, weeded, mowed, rolled, and kept all clean and handſome.

Plain draughts are only in uſe, and far preferable: that which I eſteem moſt is, plain ſtraight borders and paths running all one way, *that is*, from the houſe, with one walk dividing it in the middle, leading to the houſe-door: and if the ground be large, you may make one round by the wall alſo, as the pleaſure-garden in fig. 1. Let the borders and paths be both of a breadth; *viz.* four foot; hedge the borders with box-tree, and plant them with flowers; lay the paths, as well as the walks, with gravel; plant the walls with fruit and flower-bearing trees variouſly.

Outer-courts have only one border at the wall, planted with laurels and other greens; one pathed or brick wall in the middle, leading to the middle of the houſe-front, with a long graſs-plot on each hand.

II. The borders of your kitchen-garden, round the walks, may be boxed with Thyme, Lavender, Hyſop, rue, *&c.* the next with Parſley, Straw-berries, Violets Jelly-flowers, *&c.* Cherry-gardens and phyſic-gardens, with ſweet-brier often cut, of box cut three times *per annum*, in April, June and Auguſt, remembring to cut their roots at the in-ſide every ſecond year, that they exhauſt not the ſtrength or nouriſhment of the flowers or herbs. But that which I prefer for flower-gardens above all, is dwarf-juniper, raiſed from the ſeed and planted thus; when the ground is leveled, meaſure out the borders, but raiſe them not above the walks, except you intend to lay gravel, ſtretch a line, and, with the edge of the rule, mark it, and therein ſet the young ſlips of box, or the young plants of juniper, at two years growth; then prepare the borders,

by

by delving in conſumed dung of cows and ſheep, covering on a little lime, top'd with a little ſand, to lye all ſummer, kept clean from weeds by howing. At the beginning of winter delve and mix it together, to lye all winter unraked, and at the ſpring re-delve, ſtir and mix it throughly, and trim and plant your flowers and other plants in their ſeaſons. See part II. chap VII.

III. In making the walks in any garden, firſt, level up the borders at its ſides; ſecondly, drive a row of ſtakes in the middle of the walk, and level them accordingly, *i. e.* ſtretch a line croſs the walk betwixt the two level borders, and mark where it hits the ſtake in the middle of the walk; do this at both ends, and by viewing betwixt, you will level the reſt; ſee the next chapter of leveling. But you may obſerve, that the walk muſt riſe a little in the middle, and yet the middle of the walk, and top of the boxing of the border muſt be level, *i. e.* the boxings ſo much above the ſide of the walk, as the middle of the walk is above its ſides. Where your boxing is timber or ſtone, fill up the border of earth to the top thereof; but where your boxing is of box, juniper, or the like, the earth within the border, and edge of the walks and paths without, muſt be equal.

As for the riſe or ſwell that walks have, which makes them the ſegment of a circle, graſs or brick-walks may have, for thirty foot broad, ſix inches of ſwell; for twenty foot, four inches; ten foot, two inches; and let gravel have an inch more proportionally; agreeable to the rule of proportion in arithmetick, as twenty is to four, ſo is thirty to ſix. If gravel or brick-walks or paths lye by the ſide of graſs, make the graſs an half inch higher than ſuch. If the walk be graſs, make two foot tables, or paths of gravel, betwixt it and the border.

IV. To

IV. To lay graſs, firſt level the ground, whether a walk or plot; and 'tis the better to lye a year ſo made up, before you lay the turf; becauſe it may be leveled up again, if it ſink into holes: if it lye wet, bottom with ſtones and rubbiſh; and, if the earth be fat, take it out, and put in ſand: however lay the the ſand a foot thick immediately under the turf; then by the ſquare, ſtretch lines, ritt with the ritting-iron, which is an half round put into the end of a crooked ſtick, and raiſe the turf with the turf-ſpade, which is broad mouthed, but otherwiſe the ſame with the husbandmens breaſt-turfing-ſpade: let the turf be of equal thickneſs, near inch and half thick, a foot and half broad, and as much in length; lay their green ſides together when you put them in the cart, but do not roll them when brought home; lay them all even and cloſs, feeling each particular turf with your foot, ſo as you may diſcern any inequality, to be helped immediately; in laying, ſtill beat every two or three rows of turf, while moiſt, with the wooden-beater, and when the whole is laid, and well beat, roll it well with the ſtone-roller, which ſhould be as big as a hogſhead. The ſpring and autumn is the beſt time: and if you incline to keep a good pile of graſs, ſuffer it never to grow inch long; beat, mow, and roll it often, eſpecially in the mornings and moiſt weather.

V. But if you would lay the hard tile or brick-walks, prepare as for graſs, remembring it wants the breadth of the brick of the true height; for you muſt ſet them all on their edge, cloſs by one another on a bed of lime, laying the ſide of every ſecond row croſſing the ends of the other, and place one in the middle of the walks, that both ſides may be regular.

VI. To lay gravel, cleanſe firſt the bottoms of the walks of fat earth, and root-weeds, and bottom it with ſtones; and lay over that, about half a foot of clean

clean round gravel, and about three inches top-gravel of equal greatneſs, which may be like beans and peaſe; you muſt make it thus equal by ſifting, and ſo tread and beat; and when compleatly leveled, beat it well with the wooden-beaters, while moiſt; then roll ſoundly with the wooden-roller, and afterwards with the ſtone-roller, eſpecially in rain, for which the ſpring and autumn is beſt: but if in dry weather, you muſt daſh water on the roller continually in rolling, with the watering-pot, and if you are forced to uſe ſea or water-ſand, you may beat ſome good clay to duſt and mix with it before you lay it; weed, and roll frequently.

VII. For the orderly planting of flowers there may be three ways; as *firſt*, in the borders of pleaſure-gardens or courts, plant five rows in the border, and intermix them regularly, *i. e.* divide and plant every different ſort, through the whole garden, at equal diſtances, and not only ſo, but of every diſtinct colour alſo: let never two of a kind, nor two of a colour, ſtand together, without other kinds and colours interveening, ſo as there may not be two or three of a kind or colour at one end, border, plot, or place, and none of them through the reſt, but univerſally and ornamentally intermix'd: and when you find a breach by ſome being paſt the flower, you may have various annual flowers ſown in pots, ready to plunge into the vacancies of the borders for continuing this beauty.

Secondly, In my ſort of flower-gardens, which has borders and paths running all one way, *viz.* from the houſe, plant five rows, and intermix them, not as in the laſt way, but ſet five rows of each kind croſs the border, ſo as twenty five of each ſort may ſtand in a geometrical ſquare; for inſtance, a ſquare of Tulips, a ſquare of Boars-ears, a ſquare of Crocuſes, a ſquare of Jelly-flowers, a ſquare of Anemonies, and a ſquare

of

of Cowſlips; and ſo a ſquare of Tulips, another of Boars-ears, *&c.* again intermixing through the whole of that border the colours of each ſort: then may you make the next border ſo intermix'd, but differing; minding, that as you intermix the Bulbous and Fibrous plants in each border, ſo muſt they be alſo in the croſſing, that the ſquare of Fibrous in this way, oppoſe the ſquare of Bulbous in the next; and likeways, whatever border ſuch ſorts are in on the one ſide of the walk, ſet the very ſame in the border equi-diſtant from the walk on the other ſide, that the whole may be regular and uniformly intermix'd all the year, looking from all ſides, ends or angles.

Thirdly, In nurſeries of beds and ridges, plant every kind in thickets by themſelves, and annuals and perrennials by themſelves, excepting only that you muſt intermix their colours; *that is*, make a whole bed or ridge of each kind, ſix rows in the bed; the dwarfiſh may be eight rows: thus every thicket of them flowering in their own order will have a great ſhow, and at a great diſtance. Here alſo obſerve uniformity, *that is*, alike on each hand, ſee the laſt chapter, §. III. for if you have a ridge or bed of Jelly-flowers, or the like, on the one ſide, plant another thereof at the ſame place on the other, *&c.*

And becauſe flowers muſt be removed, ſome in one, two, or three years, and the earth renewed or enriched, and properly prepared, elſe they degenerate, becauſe in a length of time they exhauſt the ſubſtance of the ground, at leaſt that part appropriate to them; therefore you have a good conveniency for effectuating the ſame by theſe laſt two models preſcribed; for then you will have ſome beds or ſquares where your Annuals ſtood, into which you may re-plant your Tulips, Anemonies, or the like; and ſo another ſort where theſe ſtood, and your Annuals again where

theſe

theſe laſt were: and becauſe here you remove a whole bed or ſquare of a kind at once, you may very conveniently prepare, delve, ſtir, beat, ſift, and mix it throughly with the proper ſoil, a thing moſt neceſſary; and this you could not well do, where they are ſcattered as in the firſt way. See the rules mentioned part II. chap. I. §. X. and chap. VII.

As to Terraſs-walks, if the brow on which you make them be not too ſteep, the work will be the more eaſy: if you build them up with walls, be careful to found deep enough according to the level; and if the middle of the terraſs be on the central line of the houſe, or of any walk, make the ſtair to part at a plat on the head, going down at both ſides; ſo much of the ſtair-caſe may be within, as that the outer edge thereof may be in a line with the border at the wall; by this it marrs not the walk; the reſt may be at the ends: plant the borders at the upper-ſide of the walk with wall-trees, the under-ſide, being but an ell high, with Laurels, *&c.* But if your terraſs conſiſts only of walks and ſloping-banks, you may have the border at the head and foot of each bank, on either ſide the walks, planted with Standard-cherries, *&c.* and the banks of Violets, Straw-berries or Graſs.

IX. As for Ponds, make them large and broad, ſuch being beſt both for the health of fiſh and fowl; ſquare, triangle, circle, oval, or what figure fits your ground beſt; let them be five or ſix foot of ſolid water at leaſt, with ſluices to let it run in and out at pleaſure; keep them clean; for ſuch water is the moſt preferrable for watering plants.

N. B. I am againſt Arbuſt and Cloſs-walks, except trees naturally cloſing, whereby we have both ſhade and air.

CHAP.

CHAP. VII.

How to level Ground.

SECT. I.

I HAVE often wiſhed that there might be ſome rules found, whereby this expenſive work might become more eaſy. There are two ſorts of leveling, *viz.* the horizontal and ſloping: the *firſt* is beſt known, but the *laſt* more profitable and convenient. For example, I have made a plot-ſlop four foot by by two hundred long, and eighteen inches by three hundred and eighty foot the other way: This was not perſpicuous to vulgar eyes; yet to have made it horizontal would have been ridiculous, as to time, pains and expences. And in leveling the walks about a plot which ſloped naturally, ſo as to make them correſpond with the ground, I behoved to make the middle walk agree with the ſide ones, whereupon it ſlops ten foot in three hundred and ſeventy long: now if I had made this horizontal, it would have been five foot, or ten ſteps lower than the one ſide-walk, and as much higher than the other, and ſo more diſagreeable and inconvenient than at firſt, both as a walk, and with reſpect to correſpondency with the reſt of the ground within: therefore I am for leveling any ground in a ſlopping manner, that it may turn a little to the Sun, if poſſible, for draining of water, and that it may correſpond with its adjuncts, and above all, in order to prevent the more coſtly way; for 'tis certainly a principal obſervation in leveling, not only to cauſe the ground of itſelf ſerve itſelf, but alſo to level it as it lies moſt conveniently, which is the cheapeſt and eaſieſt way of leveling. When you have a row of ſtakes ſet in a ſtraight line, and at about twenty foot diſtance

diſtance, as in the edge of a border or middle of a walk, the way of leveling them, either horizontally or ſloping, is to mark and put a nail in the two ſtakes which are at the extremes or ends thereof, and to view betwixt; cauſe mark all the reſt which are betwixt in a level line therewith. This is the eaſieſt, the exacteſt and quickeſt way: and, by the ſame method, you may go round any plot, and conſequently croſs it every way according to this direction.

In what you would have horizontal, place the long rule and the level at one end, ſuppoſe the ſole of the door, till the plumb fall right in rencountering, and view alongſt the ſaid rule, as on a fowling-piece, that you may ſee what part of each ſtake it hits, and cauſe one, with a piece of white paper, or white hafted knife, hold the ſame at each ſtake, its haft tending out, as the nails which bear up the line, and direct him by words or ſigns to hold up or down till it be juſt level; when they are all marked, meaſure down ſo much on each ſtake as was raiſed up for conveniency in viewing; there mark, put in nails a little, ſtretch on the line, and level up the earth or gravel thereto.

And where you would have determined ſlops, ſet on the level, and make the moſt diſtant ſtake in a level line therewith; then meaſure down upon the ſaid ſtake or pole, from the place marked, ſo much as you deſign to ſlop, and put in a nail with white paper about it; and at the upper-ſide of the rule in the ſtake at the door, put in another nail, and by viewing betwixt theſe two, mark all the reſt as before. If the diſtance betwixt the extremes be great, ſo as the ſight may dazzle, let the viewer deſcend from his ſtation, and come forward at every five or ſix ſtakes; and holding his knife at the laſt marked ſtake, cauſe his aſſiſtant ſtake-marker proceed.

To level as the ground lies, let its ſlop be what it will, you need neither level nor rule; except you pleaſe to try how much it ſlops after it is done, for ſatisfaction; only ſet ſtakes as before, and viewing the ground narrowly, put nails in the ſtakes, which are at the extremes, where you think the ground will run when leveled, to make it ſerve it ſelf, and as it lies beſt or eaſieſt for leveling; and when you have concluded upon the level at the extremes, mark all the ſtakes in the interval, by viewing as above.

II. But to proportion the level to the ground, is the whole art of leveling. 'Tis true it is eaſy, if you have a plot or walk a foot higher at one end, to take half a foot thereof, and lay on the low end, ſo as the two ends may be horizontal; or, if it be horizontal, to take nine inches off the one end, and lay on the other, that it may ſlop eighteen inches; but if ſome places of it lye one way, and ſome another, and ſome neither the one nor the other, this increaſeth the difficulty. Wherefore you muſt firſt drive ſtakes at the corners of the plot; then view the ground about, and put nails in the ſtakes where you would have the level run, or at leaſt where you think by your eye it may fall moſt conveniently, to make it contain itſelf, and the more eaſy to be leveled: Alſo ſet up ſeveral ſtakes in the intervals and croſs-ways through the plot from oppoſite angles, and by viewing betwixt the foreſaid nails every way, mark all the ſtakes level; but if you cannot ſee from the marks of this ſuppoſed level which are on theſe corner ſtakes, ſeeing there may be ſome below the ground, little hills, or ſome ſuch obſtructions lying in the way, then meaſure equally upon each of them, ſo far as you think convenient for getting your ſight, and mind to take down the ſame again after viewing.

When

When all is marked with this ſuppoſed level, go over it, and note narrowly how it will agree, that ſo, as your reaſon ſhall teach you to alter, you may take up one end or let down the other, or both; till you bring it to ſuch a proportion, as to do its own buſineſs itſelf. Or you may work more exactly thus;

Suppoſe you have a border, or middle of a walk, with ſixteen ſtakes driven therein at twenty feet diſtance, all marked with a ſuppoſed level, and ten of theſe marks above ground, and ſix under ground: *Firſt*, Meaſure how far the marks on each of the ten ſtakes is above ground, and write them down particularly; and adding their meaſures together, you find thirteen foot four inches. *Secondly*, Meaſure how far the marks of the ſix ſtakes are under ground, write down, adding them together, and you find it twelve foot; ſubtract the one from the other, and the difference is ſixteen inches, which muſt be divided by ſixteen ſtakes in the border, that is, one inch to each ſtake; ſo that this ſuppoſed level is an inch higher over all than the true level, which being taken down, will make the ground there level itſelf, and no more. This may ſuffice for an example. And if you can thus proportion the level to one border, walk, or one row of ſtakes, you may, by the ſame rule, find the level for the ſtakes round and acroſs the plot, and conſequently level the ſame accordingly; for having once concluded on the level, drive ſtakes over all the plot as in my firſt way of planting of trees, chap. IV. § IV. and mark and put nails therein, as above is taught for carrying the line; except you mean to follow my method of leveling the kitchen-garden, or the ſame for planting or ſowing, which is only to level one border thus by ſtakes and lines, round each plot, and by the eye level up the ground within correſpondent thereto, all along in trenching: altho this is not ſo proper for

courts and graſs-plots; yet, as by this means I uſe to level ground without a level, ſo do I think this way of finding out the true level, by means of a ſuppoſed one, worthy your notice, and if rightly improved, will ſave you much money and pains.

Be cautious in founding your walls, leſt you undermine them in leveling: nor is it convenient ſometimes to confine your level to the foundation of walls already built; for in ſo doing, you may loſe more, than it would coſt you to caſt down and rebuild: but in ſuch caſes, you may rather build under gradually.

III. There are ſome bad lying plots, and walks, with an aſcent at the head, hollow in the middle, and level at the foot; theſe and the like are very troubleſome to level under one denomination; for the taking down the hill, bares it ſo, that plants cannot proſper thereon. Some are neceſſitate to take out the Gravel, Tile, or Stones, ſo much deeper, and travel earth again; but I rather adviſe to make terraſſes: You need not confine yourſelf to the number of banks, but only to the proportion and uniformity. If it tend all one way, high at one end, and low at the other, then it is proper enough for perpendicular walks that front the houſe; but if low in the middle, and high at both ends, or low at both ends and high in the middle, then more proper for parallel walks, whoſe extremities are equi-diſtant from the central line of the houſe: remember to divide and ſlop theſe equally.

This minds me of ſome abuſes which I have ſeen, as a plot of ſloping leveled ground, with another horizontally leveled lying at the foot of it, at leaſt not under one ſlop; or horizontal walks and borders lying by the foot and head of ſloping plots, theſe are unſeemly; for you ſhould always make them ſlop under the ſame denomination, except in ſteep and high banks: I have made walks of eighteen foot broad,

ſlop

ſlop eighteen inches from one ſide to the other, becauſe the whole plot ſloped the ſame way, ſo much proportionally; yet to the eye it appeared very pleaſant: But where ſuch horizontal and ſloping pieces lye contiguous, the defect is eaſily ſeen; therefore if you be neceſſitate to lay ſome plots ſo, altho' I know no reaſon for laying walks ſo, make rather a hedge to intercept; and in all your works let there be a connexion.

IV. There are ſome more obſtructions in leveling, as in a long walk, when you have the two ends found and marked, either with a ſuppoſed or true level, and cannot ſee betwixt, ſo as to do it exactly by reaſon of length: here two may go to the middle, or near it, where you may conveniently ſee both ends, looking at a diſtance backward and forward; there drive in two ſtakes near to the length of the long ſtraight rule, at which hold on the rule, and let one view alongſt the ſame, till the mark at the weſt-end be level therewith, and likewiſe the other towards the eaſt, ſo that both may alter up or down till they have their deſires at once: Then fix the rule, and having as many ſtakes ſet as is needful, you may view backſight and foreſight thereon, and level them all exactly.

V. But if a wall, a houſe, *&c.* intercept, meaſure perpendicular, and exactly up to the top thereof, and on the other ſide meaſure down the ſame again; and ſo ſet forward the level, but ſo as it may communicate with the reſt when obſtructions are removed.

But if a hill, go to the top, ſet the rule level, and laying an eye thereto, cauſe one with a long pole go down, till its top be level therewith, he holding it level by a plumb-rule; then deſcend from your ſtations, and ſet the upper end of the rule where the pole ſtood, there level it, and do as before; thus from ſtation to ſtation, to the foot of the hill, keeping an accompt

in a note-book what poles and parts it contains, which may be as eaſily taken down on the other ſide by the ſame method.

But if it be poſſible to ſee over the obſtruction on three footed ſtanding ladders, by help of long poles or pikes, as I have done in the like caſe, raiſe your level thereon, and having viewed and marked that on the other ſide, meaſure down the ſame there, *&c.*

VI. I might here ſpeak of the ſolidity of earth, whereby you may more readily count the expence of leveling: But having ſhewed in the next chapter, § V. how to meaſure ſolids, I preſume it is applicable to earth, as well as timber, ſtone, *&c.* For if you know the breadth, length and depth thereof, you may find how many ſolid ells, *&c.* And if you know how many ells and parts will load a cart, and how many carts a-day, you may go near to calculate the coſt of the whole.

VII. In leveling any ground, for kitchen-ground, orchards or nurſeries, take not away its good earth or ſurface, as you bring down the heights, but always turn over the upper part thereof behind you, carrying away that which is below ſo much deeper, that it may contain that ſurface, and put the bad earth in the bottom of the hollows, with better mould above it.

In the practice of leveling, or other works, contrive the working ſo, as there may be ſtill a motion amongſt all the parts: and altho' carts are cheaper for leveling than wheel-barrows, if the way of carriage be not very ſhort; yet if you do not ſet as many men to fill the carts, as may have the one full againſt the other come in, and no more, you loſe conſiderably; and this will be according to the diſtance of carriage, or as the earth is capable of being wrought: and ſo with wheel-barrows; three barrows for two wheelers and one filler ſometimes doth well; ſometimes more fillers or fewer

fewer wheelers; yet ſtill let them have a ſpare-barrow; and if this could be done with carts alſo, it would be of great advantage: Wherefore, in my opinion, there is no way ſo expeditious for this effect, as the carts with three wheels, whereby two men with two of theſe carts, and one horſe, can do as much as three men, two horſes, and two carts; for one man to fill the led-cart, the other man to drive the one horſe; and when he comes in, he has nothing to do, but take the traces and hooks off the empty cart, and put upon the rings of the full one, and ſo drive on. This cart has no trams or limbers, but a ſwingle-tree or breaſt-board before, where the rings that keep the traces are: it has a handſome folding body; the third wheel is about thirty inches in diameter, all of iron, and runs in a ſheers of the ſame, faſtened perpendicularly under the middle of the fore-breaſt, with an axle of iron: the other two wheels are common, but if they have an iron axis, the better.

VIII. To bring in water in pipes to your houſes, courts, gardens, ponds, parks, &c. conſider the level; for as the place into which you convey it, muſt always be lower than the fountain from whence it comes, otherwiſe it cannot flow thither; ſo you muſt take notice, that no hill in the way of its conveyance be ſo high as the fountain itſelf. You may find the level by placing your inſtrument at the well or fountain, as is directed in walks; and if a hill intercept that ſight, plant on the top thereof, that by backſight and foreſight you may find the difference, and hence you may know whether you can carry it about the obſtruction; but if the diſtance be far, you muſt needs be the more exact. As for the inſtrument, the croſs deſcribed chap. III. whoſe ſights may be two proſpect glaſſes, may do well enough, whether for one or many ſtations. Let one ſtand at the ſpring-head, another

ther betwixt and the place to which you deſire to carry the water, a large diſtance aſunder; but ſo as a third man about the middle may ſee both their mark-boards, *that is*, on their pike-ſtaves, and direct them to hold level by his back and foreſight, deſiring them to keep accompt what feet and parts; and ſo come forward till the aſſiſtant at the well plant where the foremoſt ſtood: and thus proceed quite in a ſtraight line, from ſtation to ſtation ſo long as is needful: At length, add all the meaſures of back-ſtations together, and alſo thoſe of the fore-ſtations; ſubtract the one from the other, and the remainder gives the difference of levels betwixt the fountain and the appointed place.

Allow for the fall of water, for every thouſand foot in length, twelve inches of ſlop at leaſt.

CHAP VIII.

How to meaſure, divide, and lay out Land, &c.

SECT. I.

SOME following other country-books, ignorantly meaſure out ground with their meaſures; therefore I am here to inform ſuch, that, in meaſuring all figures, whether ſuperficial or ſolid, it is requiſite to know, *Firſt*, wherewith they ſhould be meaſured; *Secondly*, how they ſhould be meaſured.

Land is done by ell or fall-meaſure, as is alſo maſons rough-work buildings; ſtone, board and glaſs, by foot-meaſure, twelve inches a-foot, and no diſtinction made betwixt a Scots and Engliſh foot; the Glaziers uſed only eight inches, but the act of parliament hath reduced them to twelve, as others. Some would think twelve inches but a third part more, whereas it is equivalent to two and one fourth of theirs; for 8 times 8 is 64, and 12 times 12 is 144, out of which I get twice

twice 94, and the 16 remaining is one fourth thereof. This puts me in mind of that queſtion, *viz.* "Whether is a ſquare half foot, or half a foot ſquare moſt?" I have heard ſeverals ſay they were both alike; but that was a miſtake: for an half foot ſquare, Superficial meaſure, is but the half of a ſquare half foot; and, if Solid, it is but one fourth of it.

The Scots ell, according to ſeveral acts of parliament, is three foot one inch, or 37 inches long: ſix ells long multiplied by 6 ells broad, is 36, a Fall-ſquare: 40 falls in length and 4 in breadth, is 40, a rood ſquare; 40 falls in length and 4 in breadth, is 160, an acre. See the Table of ſuperficial ſquare-meaſure. And thoſe who deſire long meaſure, ſix ells long is a fall, forty falls a furlong, eight furlongs a mile. See the table.

A Table of ſuperficial Square Meaſure according to SCOTLAND.

Acres	4	160	5760
	Roods	40	1440
		Falls	36
			Ells

A Table of ſuperficial Long Meaſure according to SCOTLAND.

Ells			
6	Falls		
240	40	Furl.	
1920	320	8	Miles

We

We differ in measuring land from the English, as the fall differs from the pole: Our fall is 6 ells, or 18 and an half foot; their Pole is 5 and an half Yards, or 16 and an half foot.

By what is said above, I hope you will know wherewith to measure: It only remains then that you know how to measure, of which anon.

II. In measuring all superficies, we take notice only of the breadth and length; but of solids, of the breadth, length and depth. To instance in a few: and first of some superficial figures, a geometrical square, see fig. 18. is measured by multiplying one side into itself, *viz.* *a b* or *c e*, or *a c* or *b e*, which here is 30 and an half Falls. In your workings I would advise you to make use of decimal arithmetic; because thereby you may work whole numbers and fractions together with great ease and quickness; and you may reduce ordinary fractions into decimals, by multiplying the numerator by 100 or 1000, *&c.* and dividing the product by the denominator, so shall the one fourth of any thing be 25; and the half, 5; and the three fourths, 75: therefore multiply 30. 5. into itself, the product is 930. 25. which is 930 falls and one fourth of a fall; see the example. And when you multiply decimally, whatever fractions are in the multiplicand and multiplicator, cut them off after addition; which, if there be any, will be a fraction, as here you see two cut off, *viz.* 25, which is one fourth of 100, the fall being here into a 100 parts, the integer of 25: and when you divide decimally, as whole numbers and fractions by whole numbers, put still a dash betwixt the whole number and fraction, and notice how often you will get your divisor placed under the whole numbers of your dividend,

30. 5
30. 5
1525
9150
930.25

dividend, and juſt ſo many whole numbers will be in the quotient, and the reſt fractions: or if you divide whole and fractions by whole and fractions, notice how many times you may place the whole numbers of the diviſor under whole numbers of the dividend, *&c.* or if you divide whole numbers by whole and fractions, whatever fractions ſhall be in the diviſor, add ſo many cyphers to the dividend, and do as before.

You may reduce this, or any other plot into acres, by dividing by 160, the falls in one acre, and the product here will be 5 acres, 130 falls, and one fourth of a fall.

But if you would further know what this fraction (25) is in ells; ſay, if 100 be equal to 36, the ells in one fall; what is 25 equal unto? Multiply the 2d number by the 3d, and divide by the firſt, and the anſwer will be 9 ells; ſee it wrought.

		36	1	
		25	43	
		180	930	(5
900	(9	72	160	
100		900		

Moreover, falls may be reduced into poles, and poles into falls; or Scots meaſure into Engliſh, or Engliſh into Scots: one ſuperficies is to another, as the ſquares of their like ſides; therefore as the ſquare of 16. 5. the Engliſh, is to the ſquare of 18. 5. the Scots; ſo is the contents in Scots acres or falls, to the contents in Engliſh acres or poles.

Example, The ſquare of 16. 5. *i. e.* 16. 5. multiplied into itſelf, is 272. 25. and the ſquare of 18. 5. is 342. 25. And as 272. 25. is to 342. 25; ſo is 930. 25. the contents of the ſaid plot in falls or Scots meaſure, to 1169. 43. one fourth almoſt, its content in poles or Engliſh meaſure. This I thought fit to mention, to let thoſe ſee who know not the difference betwixt the Engliſh meaſure and ours.

2*do*, Meaſure an oblong ſquare or parallelogram, ſee fig. 19. by multiplying the breadth by the length; *a d* or *b c* is its length, and *a b* or *d c* its breadth.

3*tio*, A triangle, ſee fig. 20. All triangles are meaſured by multiplying the whole baſe, by half the perpendicular, or whole perpendicular by half the baſe; *a b* is the baſe, and *i c* the perpendicular: or without the perpendicular at all, add up all the ſides, and take half the ſum; from this half ſum take every ſide, which call the three differences; multiply theſe three differences and the half ſum continually together, the ſquare-root of the laſt product ſhall be the area of the triangle.

4*to*, A trapezium, ſee fig. 21. is reduced into two triangles, and meaſured accordingly.

5*to*. And ſo is any irregular ſtraight lined figure; and if any ſide of it be crooked, draw a line that may leave out as much as it takes in: but if it cannot be meaſured within, becauſe of obſtructions, then add on the out-ſide, till you reduce it into a ſquare, and, after multiplication, ſubtract what was added, the remainder ſhall be its area.

6*to*, A Circle, ſee fig. 22. is near equal to a ſquare made of half the diameter, and half the circumference or periphery; and therefore is meaſured by multiplying *a q c o b* the ſemi-circumference, by *a d* or *d c* the ſemi-diamiter: And having any one given, you may find the other by the rule of proportion thus;

The loweſt number is, as 7 is to 22; ſo is the diameter to the circumference: or as 22 is to 7; ſo is the circumference to the diameter: Or thus, as 1 is to 3. 1416; ſo is the diameter to the circumference: or as 3. 1416 is to 1; ſo is the circumference to the diameter: or as 113 is to 355; ſo is the diameter to the periphery: or as 355 is to 113; ſo is the periphery to the diameter.

In

In this the diameter is 63 falls, and as 7 is to 22; ſo is 63, the diameter, to 198, the periphery. Take half of the periphery which is 99, and multiply by half the diameter, which is 31. 5. and the product is 3118. 5. or as 28 is to 22, or 14 to 11, or 1 to .785399; ſo is the ſquare of the diameter to the area of the circle: or as 22 is to 28, or 11 to 14, or 355 to 452, or 1, to 1. 273239; ſo is the area of the circle to the ſquare of its diameter: as 1 is to 282095; ſo is the circle to the root of a ſquare, equal to the area of a circle: as 1 is to 707107; ſo is the diameter to the root of a ſquare to be inſcribed in a circle: as 1 is to 225072; ſo is the periphery to the root of the inſcribed ſquare in the circle: And as 1 is to 886227; ſo is the diameter to the root of a ſquare equal to the circle, which is the ſquaring of a circle.

7mo, The ſemi-circle is meaſured by multiplying the radius or ſemi-diameter by one fourth of the circumference of the whole circle.

8vo, The quadrant or one fourth of the circle, by multiplying the radius by half of that arch-line, which is one eighth of the periphery.

9no, To meaſure the ſegment of a circle, as *q i o c*, firſt draw its radius from *d* to *o*, which conſtitutes the ſector *d o c*: and as the quadrant hath 90 degrees; ſo this ſector hath 40: Therefore ſay, as 90 is to the content of the quadrant; ſo is 40 to the content of the ſector: the triangle *d o i* being ſubtracted from the ſector's content, remains half the ſegment; that doubled, is the area of the whole.

To work geometrically, find the length of its arch-line thus, ſee fig. 23. divide the chord-line *a d c* of that arch into four equal parts, ſet one of theſe from *c* to *i* on the chord-line, and one of them from the *angle* at *a* to *o* in the arch-line; then draw the line *o i*, which line is half the length of the arch-line, *a o b c*; but if

the part of a circle be greater than a ſemicircle, then divide the arch-line into two equal parts, and find the length of one of theſe, which doubled, is half the length of the whole; here take the half of the arch-line of fig. 23. and multiply it by its radius *e b*, the product is the area of the ſegment *a b c d* and the triangle *a c e*, which triangle muſt be ſubtracted therefrom, and the remainder is the area of the ſegment.

10*mo*. If you would meaſure the oval, them obſerve the rules in meaſuring the ſegment, ſeeing the oval is made of ſegments; if it be from two centers, then it is but two ſegments; if from four, then it is four ſegments and a quadrangle.

11*mo*, Regular polygons, are ſuch figures as conſiſt of equal ſides and angles; and which may be inſcribed in a circle, or circumſcribed about a circle, whether pentagon, hexagon, heptagon, octagon, nonagon, decagon, dodecagon; for any of theſe, take half the compaſs about, and the perpendicular drawn from the centre to the middle of one of the ſides, multiply the one by the other, and that gives the content.

12*mo*, To meaſure any irregular figure, conſiſting of ſtraight and circular Lines, the arches and angles bending inwards: if you cannot reduce them into ſome of the figures above-mentioned within it ſelf, you may do it by drawing lines without; and after you have multiplied, ſubtract what was added, whether ſegments or others, and there will remain the area of the figure propoſed.

Mountains and valleys are beſt reduced into triangles, and ſo meaſured; for altho' they make rather ſpherical than plain triangles, yet the way of menſuration differs not: but as in plain trapezias, there are other ways of meaſuring than by triangles, as taking

the

the half of both ends and ſides added for the mean breadth and length; ſo for mounts and valleys, meaſure the circuit or baſe-part of the mountain and its top, add them together, and take half that ſum for the length: do ſo with the aſcent, or going up from foot to top, of two ſides of the hill; add the meaſure of the longeſt and ſhorteſt ſide together, taking the half thereof for the breadth, and multiply the one by the other, that gives the ſuperficies of the mount or hill.

And as you meaſured the compaſs of the foot of the hill, ſo muſt you meaſure the circuit or compaſs of the height of the valley or glen; and as you meaſured the top of the mountain, ſo muſt you the bottom of the depth of the valley; add them together, and take half thereof for the breadth: Likewiſe as you meaſured the aſcent of both ſides of the hill, ſo muſt you the deſcent, or going down of both ſides, to the bottom of the valley; add them together, and take half for the length, and ſo multiply as before.

III. Altho' I have ſaid enough anent meaſuring of land, yet there is much more required in dividing and laying out the ſame.

The firſt time I ſaw the need of it, was in making an avenue of great length, which croſſed a march ſeveral times, which took in ſeveral pieces of land, and caſt out others: but none of them being equal, neither in ſhape nor proportion, I behoved to meaſure both, and then cut off ſo much as might balance, and that from parts aſſigned.

As if, from the triangle *a b c*, fig. 24. which contains 870 falls ſquare, you would cut off 300 falls ſquare, *firſt*, finding the baſe *c b* of this triangle to be 58 falls long; ſay, if 870 falls, the whole plot, have 58 for its baſe; what will 300, the part I deſire to cut off, have for its baſe.

Answer 20; therefore measure 20 falls along the base from one end thereof, as from *b* to *d*, then draw the line *a d*, so shall *a b d* contain 300 falls, and *a d c* 570. Or,

870 : 58 :: 300
1 58
2400
1500
870)17400(20

If it be required to take off a part from a triangle, according to any proportion given, by a line drawn parallel to any of the sides assigned; let *a b c*, fig. 25. be a triangle containing 7 acres, or 1120 falls; and it is desired that 2 acres be cut off by a line drawn parallel to *a c*. Its base-line is 57 falls, which you must divide in the proportion of 5 to 2 in the point *d*; then seek the mean proportional between *b d* 42, and *b c* 57, as *b f* 48 $\frac{8}{17}$ But having in the end of this chap. shewed how to find mean proportionals arithmetically, I shall here shew you how to do geometrically.

Therefore describe the semicircle *b e c*, and at the point *d* on the base-line, raise the perpendicular *d e*, cutting the arch-line in *e*; then set the length of *b e*, which is the mean proportional from *b*, on the diameter line, and that will reach to the point *f*. Now from the point at *f* take the nearest distance to the line *c a*, and set that distance square off at *a* to G, draw the line G *f* exactly parallel to *a c*, so will the triangle G *b f* be five acres, and G *f c a* two acres, the thing propounded.

If you would cut off some part from a square parallel to one side, you need only measure that side on which you design to take it off, and divide the parts you are to take off thereby, and the quotient shall tell how much you must set off. Example, fig. 19 is an oblong square, denominated *a b c d*. I desire three acres, or 480 falls, cut off at, and parallel to the side *a b*,

b, which ſide is 32 falls; divide 480, the part you are to cut off, by 32, the ſide of the ſquare, and the quotient will be 15; therefore ſet off 15 falls from *a* to *e*, and from *b* to *f*, and the ſquare *a b f e* is 3 acres, as was required.

But if its ſides did not ſquare off, as the trapezium, fig. 21. reduce the trapezium into a triangle, and divide the baſe into ſo many equal or unequal parts as you would have the trapezium into: then find a mean proportional betwixt the extreme points of the baſe, and every particular point in the baſe; from which means draw lines through the trapezium parallel to the ſide aſſigned, which may anſwer what is required. Or,

A more ready way to work on ground, is to find the mid-line of the ground you are to cut off, and divide thereby, *&c.* But the queſtion is, how to effect this? You may firſt ſet off the whole in two triangles, *viz.* If you would cut off 160 falls at the end *a b* of fig. 21. then ſet off the half thereof at the angle *c a b*, to cut the line *a c* by the firſt; for you will find, that as the triangle *c a b* contains 364 falls, ſo muſt you go $7\frac{2}{3}$ from *a* to *e* on that baſe, to draw the line *b e*, that cuts off the triangle *a b e*, containing 80 Falls. Likewiſe as the triangle *d e b* contains 165 one half, ſo muſt you go from *b* to *f*, that *a b e f* may contain 160 falls: only the line *e f* is not parallel to *a b*; therefore as *b f* is five falls longer than *a e*, ſet 2 and an half falls outwards from *e* to G, and as much inwards from *f* to *h*, and draw the line G *h* parallel to *a b*, and ſo leave as much out as it takes in; then find the length of the mid-line betwixt *a b*, and G *h*, *viz.* *i k*, which is 16, and by the ſame divide 160, the quotient ſhall be 10. And that will reach from *a* to G, and from *b* to *h*, ſo as to cut off 160 falls at, and parallel to the end *a b*, by the Line G *h*, as was deſired.

It is required to divide the pentagon, fig. 26. into two equal parts from the angle at *a*. The whole figure is ten acres, one Rood, and twelve falls, that is, 1652 falls, then the half is 826, and the triangle *a b c* is but 441, which wants 385 of the half; therefore take 385 from the triangle *a c d*, by the first rule, and there will be added the triangle *a c f* to the triangle *a b c*, which will divide the figure into two equal parts, the thing required.

If I am desired to set off a third part of the hexagon, fig. 28. by a line drawn from the point *g*: the whole plot is 45 acres, and 145 falls, or 7345 falls; the one third therefore is 2448, and the trapezium *g e f a* is but 2041. 875. which wants 407 falls, and the fraction, which is but a little more than five sixths of a fall; wherefore I must take 407. 875. from the triangle *G d e*, by the first: Thus, If 2523. 50. the content of the triangle *G d e*, have for its base *e d*, 62 falls, how far must I go on the same to get off 407. 875? *Answer*, 10. $\frac{5}{25}\frac{3}{2}\frac{25}{3}$ that is, 10 falls, and about one fifth of a fall; the which being set from *e* to *h*, to draw the line *G h*, cuts off the one third of this irregular hexagon, as was desired.

If you were desired to lay out any number of acres at pleasure into a geometrical square, you need only reduce them into falls, and extract the square-root thereof, as at the end of this chapter, which is the length of one side, and so measure, or set off by a chain. Or,

If you would have it lye in a parallelogram or oblong square, you may lay it out, as I directed for cutting off some part from a square parallel to one side: for knowing how many falls you would have into the oblong square, you may make a side at pleasure, if not already confined to one, and divide thereby as is taught. Or,

If

If you would make a triangle to contain ſo many acres, roods or falls, double the number of falls; then take for the baſe of your triangle, any number at pleaſure, by which divide the double of the falls to be brought into the triangle, and the quotient ſhall be the perpendicular to that triangle, whoſe content ſhall be the number of falls propoſed. And herein conſiſts the reduction of figures arithmetically.

IV. Perhaps you may have occaſion to meaſure the ſolidity of earth, timber, trees, ſtones, *&c.* Now to find the ſuperficies of ſolids,

Firſt, For the ſphere or globe, multiply its whole circumference by its whole diameter, and that gives its ſuperficial content: And as 7 is to 22, or 113 to 355; ſo is the ſquare of the diameter to the ſuperficies of the ſphere; and ſo is the diameter multiplied by the axis of a cylinder to its ſuperficies; and ſo is the half diameter of a cone, multiplied into its ſide, to the ſuperficies of a cone; and ſo is the ſquare of the chord of half the ſegment of a ſphere to the ſuperficies of that ſegment.

As 1 is to 1.772454; ſo is the diameter to the root of a ſquare equal to the ſuperficies of a ſphere. Or, as 1 is to 564189; ſo is the circumference to the root of a ſquare, that ſhall be equal to the ſuperficies of the ſphere.

V. As ſuperficial meaſure hath 144 inches ſquare in one foot, ſo ſolid meaſure hath 1728: every ſolid foot is like a die, for what it wants either in breadth or thickneſs, it muſt have in length; for 12 times 12 is 144, and 12 times 144 is 1728, the cube-ſquare inches in a cube-ſquare foot: therefore,

In meaſuring a ſquare ſolid, multiply its length by its breadth, and that product by its depth.

To

To meaſure a cylinder, ſuch as a roller, multiply the ſemi-diameter by the ſemi-circumference, and that by the length.

To meaſure a cone, *viz.* it hath a circular baſe, and ends in a ſharp point, take the ſuperficial content of the baſe, and multiply by one third of the altitude or height.

To meaſure a pyramid, *viz.* it hath an angular baſe, and ends in a ſharp point, make uſe of the laſt rule.

To meaſure a ſphere or globe, *viz.* a ſolid figure every where equi-diſtant from the center, cube that diameter, and multiply that by 11, then divide the product by 21, the quotient is the ſolid content of the ſphere.

As 1 is to 80604; ſo is the diameter to the root of a cube equal to the ſphere. Or, as 1 is to 256556; ſo is the circumference to the root-cube of a ſolid, equal to the ſphere.

As 1 is to 523599; ſo is the cube of the diameter to the ſphere. Or as 1 is to 909856; ſo is the ſphere to the cube of the diameter.

As 1 is to .016887; ſo is the cube of the circumference to the ſphere: or, as 1 is to 59,217629; ſo is the ſphere to the cube of the circumference.

As 42 is to 22: or, 1 to .5236, ſo is the diameter cubed to the ſolidity of the ſphere: or, as 22 is to 42: or, 1 to .190986; ſo is the Solidity of the ſphere to its diameter cubed.

As 28 is to 22: or, 14 to 11: or, 1 to .785399; ſo is the ſquare of the diameter of a cylinder, multiplied by its ſide, to the ſolidity of the cylinder; and ſo is the ſquare of the diameter of a cone, multiplied by one third of its axis, to the ſolidity of the cone.

As 1 is to 25.1327; ſo is the diameter cubed to a cylinder.

To

To meaſure a regular polygon, as a piece of timber hewed into 5, 6, 7, 8, &c. equal ſides, with both ends alike, multiply the ſemi-circumference by the radius or ſemi-diameter, and that product by the length.

To meaſure a truncus, *viz.* a cylinder that leans, take the ſuperficies of the circle, and adding the longer and ſhorter ſides of the truncus, take the half for the height.

The ſector of a ſphere is meaſured by multiplying its ſuperficies ſpherical by one third of the height.

The ſegmeut of a ſphere; meaſure it as a ſector, and ſubtract from the ſector the ſolidity of a cone, whoſe apex is in the center, and baſe the area of the ſegment.

The ſolidity of a ſpheroid is got by multiplying the greateſt circle into two thirds of the axis, about which the ſpheroid is made.

The ſolidity of the trunk of a ſpheroid, cut off with two circles at right angles, with the baſe, ſuch as our wine caſks are, is got by adding two thirds of the area of the circle at the bung or middle together, and multiplying the ſame by the length.

Irregular diſorderly ſolids, are meaſured by help of water in a prepared veſſel, exactly cubical, ſo large as it may contain it, according to Archimedes: put the body into the veſſel, pour in ſo much water as may juſt cover the ſame, and make a mark where the ſuperficies of the water touched the veſſel; take out the ſame irregular body, and make a ſecond mark where the ſuperficies cuts the ſide of the veſſel; then take the diſtance between the two marks, in inches and parts, which multiply by the ſquare of the ſide of the prepared veſſel, and that product ſhall be the ſolidity of the irregular body ſought.

VI. If you would meaſure any ſuperficies by the table of logarithms, then ſet down the logarithm of the

the length and breadth, add them together, and whatever their ſum be, the number anſwering thereto, is the area or ſuperficial content. Which, if they be falls, and you deſire to reduce them into acres, then out of the logarithm thereof, ſubtract the logarithm of 160, the falls in one acre, and there ſhall remain the logarithm of the content in acres. Or,

If you would meaſure ſolids by the table, ſet down the logarithms of its length, breadth and depth; add them together, and the abſolute number anſwering this logarithm, is the ſolid content required.

Alſo, by the table you may extract the ſquare-root of any plot, field or other ſuperficies, with great eaſe and quickneſs: thus,

Take the half of the logarithm of the given number, whoſe root is required, and the number anſwering this logarithm, is the ſquare-root ſought. Or,

For extraction of the cube-root of any ſolid, take the third part of the logarithm of the given number, whoſe root is required, and the abſolute number anſwering thereto, is the cube-root deſired.

And to find a mean proportional between two numbers given by the table, is to add the logarithms of them together, and take half: as if you would have the mean betwixt 40. 5. and 72, thus,

The logarithm of 40. 5. is	1.607422
The logarithm of 72 is	1.857290
The ſums added	3.464712
The half of the logarithm is	1.732356

The number anſwering this logarithm is 54, for the mean proportional.

To find 2, 3, 4, 5, *&c.* means between any two numbers, take their difference, and divide it by a number more by one than the number of means deſired,

ed, as if 8 means, divide by 3, *&c.* this logarithmetical quotient added to the laſt, finds the firſt mean next it, *&c.* as, if you would have three mean proportionals betwixt 4 and 64,

The logarithm of 64 is	1.806180
The logarithm of 4 is	0.602060
The difference is	1.204120

The fourth thereof is 0.301030, which, being added to the logarithm of 4, makes 0.903090, the logarithm of 8, for the firſt mean; again added to this laſt, gives 1.204120, the logarithm of 16, and added to this, gives 1.505150, the logarithm of 32, which 8, 16, 32, are the 3 means betwixt 4 and 64.

But becauſe the extraction of the ſquare-roat is ſo needful to be known, I ſhall demonſtrate the ſame.

Example, If you were to find the ſquare root of 576, ſuppoſing it the ſquare of fig. 18. make firſt a dash at every other figure, beginning always at the firſt towards the right hand, *viz.* at 6 and 5; then juſt ſo many figures will be in the quotient or root: Then ſay, what is the root of 5? *Anſwer*, 2 is the neareſt; therefore write 2 in the quotient; and multiply the ſame, ſaying 2 times 2 is 4, write down that under the 5, and ſubtract it therefrom, ſaying, 4 from 5, there remains one; thus have you 20, the ſquare root of *G i c f*; conſidering that there is yet one figure to follow, and now you want the ſquare root of the two oblong ſquares, *viz.* *a b G h*, and *e b f d*, out of which you muſt ſubtract the little ſquare *e b i h*; therefore double your quotient or root of the ſquare *G i c f*, ſaying 2 times 2 is 4, write this down for your diviſor, one figure forward

	11
576(24	
446	
1	

viz.

viz. under 17; and uſe common diviſion, ſaying, How often can we get 4 out of 17? *Anſwer*, 4 times; write that in the quotient, and ſay, 4 times 4 is 16; that ſubtracted from 17, remains 1: Thus have you 4, the root of the oblong ſquare, out of which ſubtract the little ſquare once, becauſe you have it twice by the former doubling the oblong ſquare; therefore multiply the ſides of the little ſquare, *viz.* 4 in it ſelf, that makes 16; ſubtract the ſame from 16, and there remains nothing; ſo 24 is the ſquare root or ſide *a b*, whoſe ſquare is 576.

Example 2d, If the ſquare of this plot be 543169, make the daſhes as before, *viz.* under 9, 1, 4, and ſay, What is the ſquare of 54? the daſhes ſo direct, and not to 5; therefore mind the uſefulneſs of them: Now the neareſt ſquare root of 54 is 7: But as in diviſion, ſo you muſt look if you will get the double thereof out of the remainders and the little ſquare too; if you mind this, you cannot go wrong. But upon trial, I find it will work ſo; therefore ſet 7 in the quotient, and multiply the ſame, it makes 49; write that down under 54; ſubtract, and there remains 5: This ſhows that the root of the large ſquare is 700; conſider that there is yet two figures to follow, as appears by the three daſhes, therefore double your quotient, that makes 14, and this is the length of the two oblong ſquares; place the ſame as in diviſion, and ſay, How often can we get 14 out of 53? *Anſwer*, 3 times, and 11 remaining: Now ſubtract the little ſquare, whoſe ſide is 3, thus 3 times three is nine, from 111, there remains 102. Then there is the Root of other two oblong ſquares wanting; therefore double the whole quotient *a b*, 73, that makes 146; place the ſame as before for diviſion, and ſay, How often can

	13
	204
	151 24
	543169(737
	494969
	1144

we

an we get 146 out of 1026? or gradually, How often one in ten? we get 9 ones in ten, but not 9 fours in 12, which will remain. Then try if we can have 8: No, therefore take 7; and put in the quotient, as before in common diviſion, *viz.* 7 times one from 10, remains 3; and 7 times 4 from 32, remains 4; and 7 times 6 from 46, remains 4. Laſtly, ſubtract the little ſquare, *viz.* 7 times 7 from 49, there remains nothing; ſo the ſquare-root of 543169 is 737.

And if the number be ever ſo great, you may obſerve, That the firſt operation conſiſts of three parts, *i. e. 1mo,* Finding the root of the great ſquare: *2do,* The root of the oblongs, by doubling the quotient, and uſing common diviſion; *3tio,* Subtracting the little ſquare, for the reaſons above demonſtrated. The ſecond operation, if there be more than one, as in this laſt example, conſiſts, of two Parts, *viz. 1mo,* The doubling the whole quotient for your diviſor, by which you divide your dividend, as in common diviſion. *2do,* The ſubtracting the little ſquare, whereof the laſt figure in the quotient is always the root; and henceforth in every operation, if ever ſo many, you muſt always proceed as in the ſecond operation.

But to find the ſquare-root of a number conſiſting of whole numbers and fractions, as 930.25. the ſquare of fig. 18. work as if all were whole numbers, as before, until one figure of your diviſor come under the fraction of your dividend, and then the reſt of the quotient is a fraction, as is plain by the example.

930.25	(30.5
9	
60	05
62	

But to find the root of a Number, that is not a ſquare number, as 19, four is the neareſt, and there remains 3. Now how to know the denominator of this numerator, is to double the quotient, and add

3	
19	(4 3/9
10	

one to it, and that is always the denominator to any fraction happening in roots: Here the root of 19 is 4 and three ninths.

I have given you the geometrical Demonstration of the square-root, which shews the reason of its arithmetical operation; and this I could never find in any book.

I confess, I need to apologize for these and the like digressions, but the earnest desire of severals forced me to it.

Here place the FIGURES.

THE

THE SCOTS GARDINER.

PART II.

Of the Culture of PLANTS.

CHAP. I.

Of the ſeveral Ways Propagation.

SECT. I.

I AM not to deſcribe the varieties in the tribes and kindreds of plants, ſeeing I am not now writing an Herbal; but only what is moſt material to their propagation and improvement: Wherefore I ſhall ſhew,

I. In general, the ſeveral ways of propagation; and then particularly ſome of the moſt uſeful.

II. The ſeveral ways of encreaſing them; and theſe are,

1*mo.* By ſeeds, kyes, kirnels, nuts, ſtones.

2*do.* By off-ſets, ſuckers, and ſlivings taken from the Mother-plant.

3*tio.* By cuttings, ſtems, and ſlips, ſet without roots.

4*to.* By laying the branch of a growing plant down into the earth.

5*to*. By carrying up ſoil to it, where it will not bend down.

6*to*. By various ways of graftings.

7*mo*. By ſeveral ways of inoculation.

The buſineſs of this chapter is, to ſhew the manner and time of performing each of theſe ways.

III. And *firſt* by ſeeds: chuſe them from the faireſt plants, full ripe, the day fair, and plants dry. Lay them in the ſun and open air a little, ſome for rubbing out, others for winning in their huſks: and, as you ſhould not ſow fruits, kernels, nuts or ſtones, with their fleſhy part on, but eat, or rub it off by rolling in ſand, and then dry them a little; ſo neither waſh, wet or ſteep them: neither keep any long after they are ripe. Moſt part of them will keep till ſpring, but then many will lye till the next, eſpecially ſtony-ſeeds, berries and kernels: I do not mean Aſh, Holly, Yew, Mezerion, Hawthorn, *&c.* which naturally lye a year longer, altho' ſown immediately when gathered; yet even ſome of theſe, namely the Holly, will lye ſometimes a year longer than their uſual time, if the fleſhy part be not rubbed off.

To cover the ſeed with the mould; Of this there are are ſeveral models, according to the nature of the ſeed, ſoil, ſeaſon or fancy, either to ſow the ground and turn the ſeed in under the furrow, or by drawing trenches in the ſoil, and then drawing the earth over them with a how; or ſowing the bed, ready dreſt, and hacking in the ſeed with the ſame inſtrument; or by harrowing, raking with a rake, or drawing buſhes over the ſowed ground to cover the ſeed; or to put off the ſurface of the whole bed with the rake-head, and ſow thereon; then draw on the mould again with the ſame; and having caſt up the furrows with a ſhovel, ſmooth the bed with the rake; or make drills by lines

lines in made-up beds, ſow and cover the ſame with the rake-head, not diſordering the ranks; or to ſet the ſingle ſeeds with ſticks by lines, or to ſow the bed, and then to ſift fine mould thereon, *&c.*

Sow the ſtrong and hardy deeper than the ſmall and tender, and ſow ebber at ſpring than before winter, and deeper in a light than a ſtiff ſoil.

Altho' I uſe for the moſt part to plant and ſow every ſpecies by themſelves, yet you may ſometimes uſe mixtures, as Carrots and Radiſh in one bed; becauſe the Radiſh may be gone before the Carrots require much room: among new ſet Liquorice, ſow Onions and Lettice; and you may ſow Radiſh, Lettice, Parſly and Carrots together, gathering each in their ſeaſons: the Parſnips will ſtay till winter; and drop Beat-rave in your Onion beds, to ſtay winter, after Onions are gone: alſo Beat-rave and Skirrets, at a conſiderable diſtance in the intervals of planted Artichokes; alſo at a great diſtance among cabbages, or in the edge of the furrows of other beds.

The moſt natural time for ſowing is, when the ſeeds, of their own accord, fall to the ground; nevertheleſs, tho' many do well at this ſeaſon, as ſtony-ſeeds, and ſuch as can endure winter, yet the tender, which are many with us, do beſt in the ſpring; but for convenience, we ſow at ſeveral other ſeaſons, as in ſummer, at which time they require watering and ſhade; and in autumn, which is the only ſeaſon for ſome, which, if tender, require defence and ſhelter; nor can we have others early at ſpring without hot-beds, which is required eſpecially by ſuch as come not to perfection in our ſhort ſummer.

Endeavour to ſow when the ſoil is in good temper: a hot furrow is good, but clay-grounds will not harrow or rake when new delved or plowed, which, when

expoſed ſome time to air, froſt, ſun and ſhowers, doth crumble and fall tender; hence ought ſuch to be prepared by fallowing; ſee more particularly the manner and ſeaſon for each ſort in their reſpective chapters following.

IV. Suckers are theſe which grow, run, ſpring off or about the mother-plant, whereof are made off-ſets, by ſevering or parting them therefrom.

Take off theſe on trees and ſhrubs, with a violent, but cleanly pull; be careful of Bulbous roots and Anemonies, that you wound not the Mother-plant.

To force ſuch as are unapt to put forth ſuckers naturally, you may bare the root of thoſe of a woody ſubſtance; cut it into the pith, ſlit it down a little, and and put in a ſtick to keep the gape open; level in the earth again, ſo ſhall the ſlip raiſed ſpring, and ſo much the better, if there was an eye immediately below the cut. When the fibres are grown, cut off this plant to live by it ſelf.

Another way is to cut the root through, a little diſtance from the tree, with a cleanly ſlop downwards, and raiſe up the but-end of the root ſo cut off, till it be a little above the ſurface; as for root-grafting, hereafter to be deſcribed, level in and tread the earth again, ſo ſhall the piece left at the tree ſend forth young roots, and the root ſo cut and raiſed ſend out a top.

Rich free earth for Bulbs and other roots, will aſſiſt them to put forth ſuckers.

Cutting the tops of fibrous rooted herbs, in growing time before they flower, will help them to off-ſet, and to laſt long too.

The ſeaſon for ſevering off-ſets of hardy trees that loſe the leaf, is in the latter end of October, and beginning of November; altho' you may have them alſo any time till March, if the weather is open.

For

For young tender trees, with hardy greens, let the winter froſt be over, and before the ſap riſe. April is beſt for greens.

Bulbous and Tuberous-roots, when they have done ſpringing, *i. e.* their ſtalks and leaves beginning to wither.

All Fibrous rooted herbs, when ſpringing, and before they run up to flower; altho' you may plant many after the flower is paſt, ſtalks and leaves cut, and they ſpringing afreſh. But the firſt ſpring is beſt.

If drought, water ſhrubs and fibrous rooted plants upon their firſt planting; at leaſt ſhade them from the enſuing ſcorchings, by covering the ſurface with ſome vegetable or litter, and water the ſame throughly if needful.

And though you muſt water Fibrous and ſome Bulbous roots in drought, once in two or three days; yet be ſparing, and defend them from too much rain.

V. To propagate by cuttings, is to cut off the branch or ſtem of a plant, and to ſet it in the earth without roots.

Strip it of leaves and branches, twiſt the branch, if it is not too brittle; plant deeper than theſe with roots, and in a rich and moiſt ſoil, keeping it watered and ſhaded, until rooted; cut off their tops, except greens, as if your cutting be twelve inches long, let nine be under, and three above ground.

The better to effect their rooting, if a bending ſubſtance, as Yew, Quince, *&c.* twiſt their ends a little: If tender plants of great pith, as Jeſamines, July-flowers, *&c.* cut only at a joint or knot, and plant them, and cover theſe cuttings, eſpecially July-flowers or Pinks, with bell-glaſſes, and in ſun-ſhine ſhade them, nor ſuffer them to have any air until they are well rooted and are growing; for air rots cuttings, but it is otherwiſe in layers. If large ſtems of pithy trees, or

Poplars,

Poplars, &c. ſharp their ends down to a point, reſerving the bark whole on one ſide.

If Stock-july-flowers, ſlit the bark near the end in ſeveral parts round the ſtem, fold up the bark ſo cut, and, taking the peel'd part cloſs off, plant the ſame with this bark, ſpread as you do a root.

The time of planting cuttings is, if trees and ſhrubs, a little before they ſpring; and if herbs, when ſpringing, as above for off-ſets; and let the ſtems of July-flowers and Wall-flowers be well ſhot, *i. e.* ſomething firm, and take ſuch as have not had a flower.

VI. To encreaſe by laying, is to bend down ſome branch to the ground, and, with a booked ſtick thruſt into the ground, ſtay the ſame in its place, and cover with earth of deepneſs as you ſee fit: Let the ſoil be good, watered, and ſhaded in drought from the ſcorching ſun, and ſheltered in winter, if needful.

To force their rooting, if July-flowers, prune off the under and withered leaves, and cut it at a joint into the pith, *i. e.* half way through, and ſlit it up to the next joint; thruſt down the cut part gently into the ground, making it faſt, and cover it as before. If trees and ſhrubs, prick the rind full of holes at the place interred, or cut away the bark round at the ſame place; but if the branch be ſmall, uſe it as July-flowers, and if any refuſe, bind them hard and faſt above the ſlit with a piece of pack-thread or wire, to ſtop the ſap in its courſe, that it may provide for rooting. Cut off all your tops as you lay them, except greens, and ſome very pithy trees.

The time for laying all trees and ſhrubs that loſe the leaf, is October, as alſo March if ſecured from drought: For all greens in April, which therefore muſt be ſhaded: For July-flowers in March, April or July.

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The trees or ſhrubs will be rooted that time twelve months, at which time tranſplant them. The July-flower if laid in June may be tranſplanted or taken off in September.

VII. Circumpoſition is uſed in all caſes, as laying, except only that the earth muſt be raiſed up to the branch, becauſe it will not bend down to it: Therefore faſten a pot, baſket, old hat, or the like on the tree, by a ſtake or ſome ſupporter; let it have a hole in its bottom, through which you muſt put the branch to be propagated, and then fill the pot with rich earth, having ordered the branch, as before, to cauſe it root, and water it often: Willow earth or rotten willow-ſticks at the bottom of the pot, helps to retain the moiſture. I have effected this with clay and cows dung well mixt, after part of the Bark has been taken off round, clapt about with a double or triple ſwaddling of ſtraw or hay ropes.

This is a mid-ſummer as well as a ſpring work, and very notable for propagating ſuch as can ſcarcely be otherwiſe obtained.

VIII. Graffing is to take a ſcion or twig of a tree, and place into another, call'd a ſtock, fit to receive the ſame, that the inward bark or rind of both may join, and the ſaps unite, *&c.* Whereof there are ſeveral ways, as,

1*mo*, Of graffing in the clift; ſaw off the head of the ſtock in a ſmooth place, about half a foot above Ground, for Dwarfs and Wall-trees; as alſo, Standard, Apple and Pear; for they will ſhoot up for a body but betwixt three and four foot for Standard-cherry and Plumb. Pare its head raggled by the ſaw ſmooth, then cleave it a little beſide the pith, and with your pen-knife cut away any jags, roughneſs, or blackneſs, that remains after cleaving on each ſide the cliff within; then prepare the graff, by cutting on both

ſides

ſides from ſome knot or bud in form of a wedge, ſuitable to the clift, with little ſhoulderings, not raggling the end: For if the bark be raiſed at the tail or lower end of the graff, eſpecially the cherry, it impedes its growing; cut off its top about three inches above the ſhoulderings, cloſs behind a leaf-bud, then open the clift with a graffing iron; ſet the graff, or two graffs if the ſtock be great, in the clift, ſo as the inward part of the rind of the graff may join exactly and cloſs to the inward part of the bark of the ſtock; and if it pinch, as great ſtocks will, bind it not as you muſt do the ſmaller: Or put in a little wedge gently to keep it; take a ſlice of bark from the cut off head, and cut a hole therein, ſo as it may ſlide on, and join round the but of the graff, and cover the ſtock cloſs over in form of a hawk's hood. Laſtly, Cover it with clay, tempered with horſe-dung that hath a little ſhort litter in it, or with ſoft wax for ſmaller ſtocks: This is to preſerve it from cold and drying wind, and from wet which hurts moſt.

N. B. If the ſtock ſtands perpendicular, ſet the graff on the weſt-ſide; if not, then place it on the upper ſide; if you fear winds, ſupport them with ſticks, as ſplinters to a broken bone.

Unbind, when you find their bands hurt them, towards mid-ſummer; at which time top ſuch as have ſhot ſo large as to be in danger of breaking with the winds, eſpecially theſe graffed in the bark, hereafter to be deſcribed.

Pull up ſuckers cloſe and cleanly from the roots; alſo rub off buds that appear on the ſtock. Graffs cannot thrive or proſper, if the ſtocks be uncleanly or ill-thriving, and this is occaſion'd through bad training.

Another way of clift-grafting, is, to cleave the graff and not the ſtock; thus, prepare the ſtock and graff as for ſhouldering, next deſcribed; then with the pen-knife

knife cleave the inward face of the graff in the cut part, and cut up the ſtock with a ſlop, ſo that one lip of the clift ſcion may be bound on the one ſide of the ſtock, and the other longer lip on the outſide, as in ſhouldering.

The graff ſits here, as on a ſaddle, with a leg on each ſide the ſtock, and therefore will better reſiſt the winds; as alſo, the wound cauſed by the clift will ſooner recover. I have them wholly healed the ſame year wherein I graffed them.

Shouldering is to cut off the head of the ſtock, and ſmooth it as at firſt; then cut the graff from a knot or bud on one ſide, ſloping about an inch and a half long with a ſhoulder, but not deep, that it may reſt on the head of the ſtock: The graff muſt be cut from the ſhoulder, ſmooth and even, ſlopping gradually, that the lower end be thin; place the ſhouldering on the head of the ſtock, and mark by the end of the cut part of the graff, and cut away ſo much bark off the ſtock as the graff did cover; then place both together, that the cut parts of both may join, and ſaps unite one with the other; bind them cloſs together with a baſs, and hood them with clay tempered with dung or wax, as before.

Graffing in the bark may be uſed in greater ſtocks, or in re-graffing of old trees, and is only for Apples and Pears, becauſe later in performing, which may be the latter end of April, when the bark of the ſtock will peel; for when both ſtock and graff is prepared, as in ſhouldering, inſtead of cutting away ſome bark off the ſtock, for receiving the graff, you muſt ſlit it on the ſouth-ſide from the top, almoſt as long as the ſloping part of the graff, and looſen the bark at the top of the ſlit, with the point of the half round wedge, made of purpoſe, tapering downwards to a point; which alſo thruſt down between the bark and ſtock, to

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make room for the graff; but firſt cut a little bark at the thin end of the ſlop of the ſcion, that it double not in going down, yet leave it with a ſharp edge; and becauſe, when the ſcion is put in, it will bear the bark hollow from the ſtock-nick or ſlit, preſs the bark on each ſide the ſcion, ſo that it may fall cloſs to the ſtock, and to the edges of the ſcion, then bind and cover as before.

Graffing by approach, is good for theſe that hold not well otherwiſe; but herein the ſtock muſt be placed ſo near the tree where the graffs are, that the branch may reach it; then may you clift or ſhoulder-graff the twig you mean to propagate into the ſtock; and aſſoon as graff and ſtock do unite and are incorporated together, cut off the ſcion or graff underneath, cloſs to the graffed place, that it may ſubſiſt by the ſtock only.

Root-graffing is, to take the twig of any tree you mean to propagate, and a piece of root of the ſame kind, cut and raiſed up a little, as in § IV. and graff them by ſhouldering, uniting the but-ends of graff and root, cauſing the rind of the root join to the rind of the graff, and ſo bind them: The next year they may be tranſplanted to a nurſery: theſe will be eaſily dwarfed, and readily hold; beſides that the defect of ſtocks are ſupplied, and they fit for tranſportation.

There are many other ways, but theſe named are the moſt material.

The time of graffing is, when the ſap begins to ſtir in the ſpring; you muſt begin earlier with Cherries, and Plumbs, ſome later with Pears, and end with Apples.

Chooſe not your graffs from ſuch trees as are ill-bearers, neither from ſuch as have not come to bear at all; but from conſtant and well-bearing trees, and the faireſt and fulleſt of buds thereon: Let them have a piece of the preceeding year's ſhoot, whereof make

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the tail and ſhouldering immediately below the but of young wood; and if the ſtock be large, make the graffs wholly of the laſt year's ſhoot; and ſuch, having blowing buds actually upon them, I have ſeen bear fruit the ſame year. But ſome old bearing trees yield no graffs; wherefore you may cut out ſome great branch, that it may ſhoot anew; or rather take off the ſame branch by circumpoſition, and plant, and the new tree may furniſh you with graffs. Cut your graffs, 'ere they ſprout, and keep them or carry them with their ends in clay, or dry in a box, their tops being cut off.

IX. Innoculation differs from the former way of graffing, and is moſt proper for Apricocks and Peaches: any ſort will more readily hold by this than by graffing, except Cherries; they come quickly to be a tree: for I had a Plumb ſhot above ſix foot ten inches the firſt year; and tho' they miſs, yet the ſtock is not the worſe. Therefore,

In ſome convenient and ſmooth part of the ſtock, at the ſame height as for graffing, with the pen-knife cut the rind athwart, and from the middle thereof, gently ſlit the bark about an inch long, in form of a T, not wounding the ſtock; then nimbly prepare the bud, by cutting off the leaf to a little of the tail; then ſlit the bark on each ſide, a little diſtance from the bud, and, about half an inch above and below the ſame, ſharpen the end below, that it may the more eaſily go down; and having a quill cut more than half way, about an inch long at the end, for dividing the bud and rind from the ſtalk, therewith take it off dexterouſly, and leave not the root behind; for if you ſee a hole under the bud on the inſide, the root is gone; caſt it away, and prepare another when the bud is ready; then with a bone, made half round, and ſharp at the point, tapering on one ſide, raiſe the

bark or rind on each ſide the ſlit carefully, not hurting the inner rind, and with care put in the bud, thruſting it down till its top join with the croſs cut; then bind it cloſs above and below the bud with dried ruſhes or baſs. Or,

You may ſlit the bark of the ſtock upwards from the croſs cut. Or,

Cut the edges of the bark about the bud of an oblong ſquare, and the bark of the ſtock fit to receive the ſame. Or,

Reſerve one fourth of this ſquare piece of bark of the ſtock untaken off at the upper end, which muſt be raiſed, that the ſhield may ſlide up betwixt the ſame and the ſtock, and ſo bind it gently as before.

The time for Inoculation is, when the ſap is moſt in the ſtock, namely from June till Auguſt; near a month after unbind, *i. e.* cut through binding and bark, with a gentle ſlit on the back-ſide of the ſtock leaving the binding to fall away of its own accord, at which time you will ſee which holds. In March following, cut off the head of the ſtock four inches above the bud, and at that time twelve months, the ſtub too, that it may heal over the wound. You may prune as graffs, and pull up ſuckers, *&c.* See chap. IV. for more.

Chuſe buds from good bearers, as before; take them from the ſtrong and well grown ſhoots of the ſame year, and from the biggeſt end of the ſame; and if you muſt carry them far, firſt cut off the leaves and top of the ſtalks, and wrap them in moiſt leaves or graſs.

This much at preſent in general, for the time and manner of the ſeveral ways of propagation.

X. In planting all plants, prune their roots, *that is*, top them a little with a ſharp knife, except Aſparagus. Alſo cut their heads, except greens, and tops of for-

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reſt trees ordained for timber; but the ſide-boughs moſt, that the head may be proportion'd to the root.

Plant no trees deep, altho' ſome deeper than others; when their roots run near the ſurface, there they receive the beneficial influence of the ſun and ſhowers, which make vegetables fair and fruitful.

Lay Litter, or the like, above ground, the compaſs of their roots, eſpecially the firſt year of planting: And indeed all plants require ſome ſhelter and ſhade with moiſture, when firſt planted, till they get rooting and ſtrength.

Cut the leaves and ſtalks of flowers and herbs, when paſt flower or yielding ſeed, nor at any time ſuffer too many; rather purge them in time. No more branches, flowers, fruits, on any tree or plant than the root can nouriſh perfectly.

Neither plant or ſow every year the ſame plants on the ſame ridge or bed, for it improves them to be changed; ſee more fully planting, pruning, preſerving, *&c.* in their reſpective places following.

CHAP. II.

How to cultivate and prepare GROUND.

SECT. I.

HAVING ſhewed the ſeveral ways of propagating plants, it is alſo moſt requiſite that you prepare the ground for effectuating the ſame. And that is in the firſt place,

To trench it, *viz.* Begin at one end of the ground you mean thus to cultivate and open, by a trench from one ſide thereof to the other, three or four foot broad, and from one to two foot deep, as the quality of the ground admits, and the plants require, as Liquoriſh, which muſt have it deeper: This being opened, mea-

ſure off other four foot parallel at its ſide, turn that into the open trench, with the turff or ſurface in the bottom, and the clean earth on the top; the filling whereof emptieth another; therefore cut off other four foot, and turn in as before; thus trench by trench till the whole be finiſhed. I preſume you carry the earth of the firſt trench to fill the laſt, or have otherways filled hollows therewith, and left the laſt trench open, if convenient, for receiving weeds. Or if the ground be hollow in the middle, begin there, and trench both ways to help the level; if high in the middle, begin at both ſides or ends, till the two open trenches meet at the height, for the ſame reaſon.

The latter end of harveſt the ground is ſofteſt for trenching, and it lying all winter open to the weather is thereby meliorated: For as trenching doth well prepare hard, barren and untoil'd ground, ſo doth it ſuch as is exhauſted by long and unſkilful uſage; and if at every trenching you apply proper manures mixt with the ſecond ſpading, or under the laſt ſhoveling, and in five years re trench, it will become to your wiſh for all gardens and plantations.

II. The next excellent way of preparing ground, is fallowing: begin aſſoon as you reap the crop; but let the ground be ſomething moiſt, altho' you ſhould ſtay for a ſhower; if it be not late in autumn, you may fallow in November, eſpecially if it is ſtiff ground, and re-ſtir in March or April when you plant or ſow: and altho' you ſhould neither plant nor ſow it that year, keep it clean of weeds in ſummer by hawing, &c. and at autumn fallow again; but as in trenching, ſo in this work, you ſhould mix it with proper ſoil.

Make uſe of the Engliſh fashion of ſpades, which are now common, and let every two delvers have a ſhoveler to caſt up the ſmall mould that falls in the bottom of the furrow; and the delvers ſhould turn up the

the point of the ſpade, and nimbly break and chop all the clods thoroughly; this is very material, as well as the thorough mixing of the manures with the ſoil; ſo that mixing, ſtirring, re-ſtirring, and fallowing, is moſt pertinent for the cold, chill'd, barren, rugged natured ground in Scotland, all which ſoftens and tenders it, and ſo fits it for nouriſhing good ſeeds and plants, as I can tell by experience: Therefore,

III. I adviſe our huſbandmen alſo to the fallowing of their land as one requiſite: Slit-folding the ſame, as a ſecond: Watering or overflowing the land, as a third: Burning the turf, as a fourth: Draining exceſſive moiſture, as a fifth: Applying proper ſoils and manures, and that at proper ſeaſons, as a ſixth: Laying the land to reſt, as a ſeventh: And above all, incloſing and planting about their land, as the laſt and beſt improvement.

Example; At the autumnal fallowing, delve or plow deep, and apply hot unrotted and uncompounded dung and manures; at ſpring re-plow or re-delve, and apply ſuch dungs and manures as have lien mixed and rotted with earth; then mix, rake or harrow. The ſummer fallowing is to deſtroy the weeds, and that may be done by turf, plough or hawing.

The huſbandmens ſlit-folding is equivalent to Gardiners covering the ſurface, eſpecially of dry and barren ground, with litter, *&c.* The dung and urine of ſheep and cattle waſhes evenly into ground, and ſhould be turned down by the ſummer and autumnal fallowing, leſt its ſubſtance exhauſt by the ſun and air, except that for graſs, then only harrowed with a buſh of thorns; inſtead of which Gardiners ſhould top their coverings of litter with a little earth or ſand, and at autumn delve all down together.

Huſbandmens watering is, by running plough-furrows, and trenches where needful, alongſt or croſs their land,

ſo as the water may gently ſwim over the whole: This is to be done in the winter on dry and barren grounds, which leaves a ſulphureous pinguidity behind it, and ſtrongly improves either for graſs or corn; but that this huſbandry ought as well to be practiſed on wet grounds, is evident, becauſe the running of this carries away the ſowr quality of the other. I ſhall ſpeak of Gardiners watering more particularly.

Burning land is, to pare its ſurface with the turf-plough, and lay the ſame in heaps to burn, and ſo ſpread the aſhes: But if moſs and heath, ſet fire through without turfing it; this deſtroys its noxious ſowr nature, and the ſalt remains in the aſhes, for the ſtrengthning the ſpirit of the earth.

Draining the wet, bogy or dropſical ground, is, by trenches a little deeper than the ſpring, how deep ſoever it is, and then apply lime, ſoot, aſhes, pigeons-dung, *&c.* As for the abounding of ſuperficial water, that is eaſily helped by common water-ſewers, or in ſome grounds by ſinking holes down to the channel.

As the huſbandman ſhould have his land laid out or divided into ſeveral claſſes, ſome for corn, ſome for meadow, and others for paſture; ſo when he has taken five, ſix or ſeven crops of corn, he ſhould lay it out for paſture, otherwiſe it will wear out of heart; and likewiſe the paſture muſt be plowed up for corn, eſpecially when it begins to grow moſſy.

The way that the Gardiner turns his ground to reſt, is by trenching and re-trenching, whereby it can never wear out; altho' he muſt alſo obſerve to change the crops as well as the huſbandman.

How to incloſe and plant about your land, ſee chap. IV.

IV. Among all the varieties of ſoils, that next the ſurface of them is beſt, becauſe prepared by the influence of the ſun and ſhowers.

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That called a loam or light brick earth, is the moſt natural ground for gardens and plantations; ſtrong blue, white, or red clays are worſt: But the nearer they are to a mixture of loam, or if they have ſtones naturally in them, they are the better: alſo the nearer gravelly or ſandy grounds incline to loam, ſo much the better. Therefore if your ground be ſtiff, trench with ferns, ſtraw, bean-ham, thatch, litter, earth under wood-ſtacks, ſmall ſticks, &c. If gravelly or ſandy, then trench and mix with loam or the upper part of clay; the turf of both is good.

If ſtrong clay, trench and mix with fat ſand, high-way earth that hath drift-ſand in it, rubbiſh of buildings, lime-rubbiſh, gravel, &c. And if it be for gardens or orchards, enrich it with dung mixt with drift-ſand, or light mould, heaped up *ſtratum ſuper ſtratum i. e.* laying by laying. And if the ground be cold, the more pigeons and poultry-dung you put upon it, the lighter and warmer it will be. Or make *ſtratums* of earth, dung, and unſlaked lime-ſtones to lye a year, and then apply this compoſition, which has been hitherto a great ſecret: Therefore prize it.

Binding grounds, which will not rake as you delve, if dry and hard, trenching and fallowing expoſeth them to be ſoftned by weather as is ſaid: But if wet and tough, mix with aſhes, ſea-ſand, &c. in culturing.

For preparing my compoſts, I uſe a pit, wherein ſometimes I raiſe a hot-bed, made oblong, about four foot deep, as I can get dungs, vegetables, and ſoils to fill it: Here I lay all kinds or ſorts with *ſtratums* of earth, as horſe, nolt, ſheep, pigeons, and poultry-dung, ferns, weeds, leaves, ſoot, aſhes, ſticks, ſaw-duſt, feathers, hair, horns, bones, urine, ſcouring of ponds, ditches, blood, pickle, brine, ſea-water, the cleanſing of a houſe of office, &c. I let them lye a year at

at leaſt, but not above two: Then I take them out, and then ſtir, air, mingle and work them by themſelves, as I have occaſion, till they become ſweet and of an agreeable ſcent, yet retaining their virtue; this frees them from the noxious qualities they otherwiſe retain, and conſequently are not ſo apt to gender or produce worms, weeds, and muſhroms, inſtead of wholſome and pleaſant plants, fruits, and roots for the table.

V. Obſerve what manures are proper for the ſoil. All hot-dungs and manures are proper for cold, ſtiff, and moiſt grounds: So all rotten and cold dungs and manures are proper for dry and hot grounds. All manures that retain moiſture, are for poor, ſandy and gravelly ſoils.

Horſe-dung is for ſtiff and cold ground: Cows and ſheeps for hot and dry; Aſhes for cold, ſtiff and moiſt; old woollen-rags for poor and dry; Lime moſt excellent for muiriſh and heathy land; hair of beaſts for dry and ſtiff grounds; pigeons and poultry-dung for cold and moiſt; rotten ſaw-duſt for dry; rubbiſh of building for ſtiff cold grounds; ſalt for cold and moiſt; but uſe it moderately, for it deſtroys vegetables on dry ground, eſpecially at firſt, but when melted by winter-rains, it fertilizeth: Some have ſown it on moiſt muiriſh land to great advantage, for being far from the ſun they have little volatile.

VI. In your applications you are to conſider, That rotten-dungs and manures are proper for trees and ſuch ſlow growing plants; and unrotten dungs and manures for annuals, they being quick of digeſtion.

Let not the root of any tree ſtand on dung, far leſs unrotten-dung, which burns them; but upon prepared and proper ſoil, and compoſed, well mixed, aired, ſtirred or fallowed. Moſt nouriſhing are the cleanſings of ſtreets and highways together, with the mud and ſcouring of ponds and ditches: If firſt laid on heaps

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in the open air to rot and ſweeten, and if you mix it with *ſtrata* of lime, that adds much to its goodneſs and fertility.

Forreſt-trees require not ſo much dung as fruit-trees; but well mixed and fallowed ſoil.

Kitchen-herbs and roots require very fat, light, warm, and well cultivated ground.

Flowers and fine plants cannot endure ſoil too rank with dung, neither can they proſper if it be poor; but freſh, clean earth, with rotten nolts-dung, well beaten and mixed together, and a little rotten willow-earth a little below the roots: then comes in that delicate ſoil, the turf of the paſture, mix'd with a little cow's and ſheeps-dung, well rotted and mingled as before. See more particularly what ſoil each kind or ſort of plant delights in, or loves beſt, in their reſpective chapters and ſections following.

VII. As for making the hot-bed for raiſing early and tender plants, dig a pit two foot deep, becauſe in the Spring the ground is often wet in this country, and of length and breadth as you have occaſion, in a convenient and warm place, lying well to the ſun and ſheltered from winds, which you may help by art, if not naturally ſo; fill it with dung and litter from the ſtables, about a fortnight's gathering, and, when well tread, and even on the top, lay about four inches thick of rich, light, but freſh and clean, ſifted mould thereon: arch it over with ſticks, and cover it with matts four or five days to cauſe it heat; then uncover and give it air a day or two, that its violent heat may paſs off; then ſow your ſeeds and cover the bed again. And the next day, if you find the bed too hot, give it more air; if too cold, caſt ſome ſtraw on the covering, untill the heat return; thus, by airing and covering, you may keep it in a conſtant temper: when the ſeeds come up, give them air to dry the moiſture raiſed by the heat

heat of the bed. How to cover the ſeeds with glaſſes, ſee chap. VI. § I. But as there is great trouble in rightly ordering this ſort of hot-bed; ſo it is here remedied by a better, which is only to fill and tread the pit full of new dung and litter, not covering it with earth, and place wooden caſes therein, about nine or ten inches deep, and about three foot broad, having wood-handles at the ends; bore them full of auger or wimble-holes at the bottom, and fill them with the ſaid earth, and therein ſow your ſeeds; inſtead of theſe ſome uſe baſkets or pots, which are very fit: but theſe caſes with the earth in them muſt be kept warm during the whole ſeaſon wherein a hot-bed is neceſſary; and if they loſe heat, add freſh dung and litter under, about and betwixt the caſes, conſequently the trouble of tranſplanting from one hot-bed to another is hereby ſaved. There is dew on the glaſſes while the heat remains, but if exhauſted, they will be dry. Provide a ſhelter over the whole, if you pleaſe, and frames of glaſs over the in-ſide caſes; others you may leave open, as your ſeeds require. By this your pit and caſes are every year ready to your hand, requiring only a ſupply of freſh dung. But this pit will be ſo much the more excellent, if lined round at the ſides with brick: and where you cannot conveniently ſink it for water, you may build the ſame above ground. And when this pit is empty, it will be alſo ready for wintering of flower-pots, with July-flowers, &c.

VIII. In watering plants, uſe not well-water, eſpecially for tender plants, neither rivers that run long and quick on ſharp gravel: theſe yeild no nouriſhment to plants, but rather chill them; therefore if you muſt uſe ſuch, let them ſtand ſome time in the ſun and open air, uncovered in tubs.

When dung lies above ground about any plant, as I uſe to do with trees, Artiehokes, &c. the water deſcending

ſcending thro' the ſame is very reliſhing to the roots, if you pour the water at a little diſtance round the tree: for, when laſhed on the ſtem, it waſheth the earth from the roots.

Water no plants with ſtanding, ſtinking, ditch-water, nor any water that ſtinketh: rain-water and large pond-water is excellent, but keep it not too long; yet, if in a large veſſel, the oftner you ſtir it, the longer it will keep ſweet: ſo the larger your ponds or rivers are, and the opener to the ſun and air, and the more moved by horſe, geeſe and ducks, the ſweeter it will be. And, if the waſhings of ſtables, ſtreets, dung-hill water, *&c.* run into them, that adds much to their fertility, providing they have ſome ſtirring, to make them ſweet, and diſſolve the crudities of dung, *&c.*

If you fear dry weather, defer not too long, but water while your ground is yet moiſt, if you intend to water at all. Theſe that root deepeſt water moſt; and alſo when you begin, continue it as long as you find occaſion. In watering trees and greater plants ſtir and waken the earth a little about their roots with a fork, ſo as it may drink the more equally, minding to tread it firm again. And for the ſame cauſe you may ſink the earth a little, in form of a ſhallow diſh, round your artichokes, *&c.* Dip your flower-pots in a tub of water, to drink through the holes at the bottom.

When you water beds of ſmall ſeeds with the watering pot, ſhake it nimbly, that it may fall like a ſhower of ſmall rain. I have often made uſe of a handful of ſmall ſtraw or hay, drawn as thatch, tyed in the middle, and at one end poured water with a cup, and ſhaken the ſame, that it appeared like a gentle bedewing rather than a glutting rain.

Some that are deſirous to have the ground always moiſt about any plant, generally place near it a veſſel with

with water, and in it a piece of woollen cloth, with one end thereof hanging out to the ground, and the other in the water: The cloth being firſt wet, will drop continually, if the end without be lower than that within the veſſel; and when the water within fails, it may be augmented: If it drop not faſt enough, the cloth may be increaſed, if too faſt diminiſhed.

Early in the ſpring while the weather is yet cold, I intreat you to be cautious in watering the leaves of the young and tender plants, only wet the ground about them: When your plants or ſeeds are more hardy and the nights yet cold, water in the forenoons; but when the nights are warm, or days very hot, then the evening is the beſt time.

Plant in wet, and ſow in dry; I do not mean over wet or over dry, and always let them have good air, which conduceth much to their health and life, without which nothing can live.

CHAP. III.

How to propagate and order Forrest-trees.

SECT. I.

Omitting here the diſtinction of ſpecies, having confined them to one chapter, I ſhall ſpeak briefly, yet, I hope, plainly of their government, thus:

Altho' the moſt of Forreſt-trees may be increaſed by ſuckers, layers, &c. Yet if you deſire trees worth your while, raiſe them from the ſeed. Therefore prepare a ſeminary or ſeed-plot, together with a nurſery well ordered and handſomely made up in beds, as in part I. chap. V. § II. And there ſow and ſet your ſeeds and plants in their reſpective ſeaſons; keep them clean from weeds, and water them when need requires

quires. Alſo dig up and dibble in theſe caſt up by the froſts, as well as ſhade and ſhelter them in time of neceſſity. Let them ſtand, ſome but one, others two years in the ſeminary after they riſe; then remove and plant in nurſery, in diſtance a foot one way and half a foot the other, or five rows in the bed, if ſix foot broad, in ſtraight lines, having firſt prun'd their roots, eſpecially top'd the main root that runs ſtraight down; ſo ſhall they ſend forth ſide or feeding roots, and agree well with tranſplanting thereafter. Alſo proportion the head to the root, by pruning up the ſide-boughs, reſerving ſome of the ſmalleſt all the way on the body, to ſtop the ſap in its courſe, that the tree may grow great with its height, and this will prove the beſt fortification againſt the winds.

Cut not the tops of theſe trees you ordain for timber, except ſome grow crooked in the nurſery; theſe, except greens, you may fell near the ground in the ſpring, or at midſummer, and train up the ſtraighteſt ſhoot again to be the tree. When they have ſtood three years at moſt in this nurſery, replant them at a wider diſtance in ſpade-bit trenches, three foot one way, and two the other, where they may ſtand till they are ready for planting out in your avenues, parks, groves, *&c.* which will be in three years, if theſe rules be obſerved. But if you think them yet too ſmall for ſetting out, you muſt tranſplant them at a wider diſtance, and at every removal top all their roots with a ſharp knife, and thin the ſide-boughs for lightening the head; but do not prune up all, as is the cuſtom of ignorant Gardiners, whoſe trees are ſo long, ſmall and top-heavy, that they cannot ſtand: But of pruning more hereafter. If you neglect this tranſplanting and pruning the top-root, while young, your eſſays to do it when old will prove ineffectual, nor will they ever be worth the while.

All the time that your trees remain in the nurſery, and at leaſt the firſt and ſecond year thereafter, be careful to cleanſe them from weeds and ſuckers, by delving, howing, *&c.* The advantage here will ſoon counter-balance the coſt.

Chuſe your ſeeds from the high, ſtraight, young, and well-thriving trees; and the faireſt, weightieſt and brighteſt thereon; for 'tis obſerved, that the ſeeds of hollow trees, *i. e.* trees whoſe pith is conſum'd, do not fill well, or come to perfection, as Langford ſays of Pears, concluding that the kernels of fruits depend much upon the pith. And I adviſe you to reject ſuch as were never ſet by art, as peeviſh parents for children, that muſt be thus accommodated with uncouth lodgings, as well as dyets in their travels: 'Tis a fatality attending many people, who account all things ridiculous that they have not been bred up with, or accuſtomed to; ſo with trees in ſome reſpect.

II. As for the Oak, the Acorns which we get from put forth a luſtier root than ours; nor do I approve of them in natural woods; they ripen in the beginning of October, then gather them in a dry day, and lay them in ſome open room to dry a month, turning them with a broom; then lay them in a couch of dry ſand till the latter end of February; dibble them in the ground two inches deep, twelve rows in the bed, if ſix foot broad, and they will come up the ſame ſeaſon; and altho' they will grow on any ground, yet they grow better on the beſt, that is, a good loamy earth. Order them as is directed in the nurſery.

The Elm that grows with a clean and taper body is moſt worthy your care: We have extraordinary clean and ſmooth barked Elms from Holland; but I think they take more pains in preparing and making the earth fine for them, which certainly is moſt conducible

cible to their ſmoothneſs. Their ſeed falls in the beginning of June, tho' it doth not fill every year; when they begin to fall, gather and ſpread them on a cloth a little, then ſow them immediately promiſcuouſly over the bed, and very thick, covered with near an inch of earth; I had them come up within ten days; they love a light earth ſomething moiſt.

The Aſh ſeed is ripe in November and December; having ſpread them a little to dry, put them in a hole *ſtratum ſuper ſtratum* of earth and ſeed; take them out at ſpring come twelve months, and ſow them as Elm, for then they riſe, and love a tender ſoil not too moiſt.

The great Maple, commonly, but falſly called Plane, its ſeed is ripe in September; ſow it at ſpring, it comes up that ſeaſon; affects a ſoil with Aſh, or rather better and ſtronger.

The ſmaller Maple is rather for hedges; its ſeed lies as Aſh.

The Beech ſeed ripens in the end of September, but it fills not well every year, nor have we ſuch plenty of old trees as could be wiſhed; for that cauſe we ſend abroad for ſeed: Aſſoon as it comes to our hand it may be ſown, or rather kept in a couch of ſand, as the great Maple, till the ſpring; for it comes up that ſeaſon; it affects a light ſoil, not clay.

The Walnut and Cheſnut, altho' they are fruit-trees, I plant without the orchard walls; their nuts ripen in the beginning of October: When they begin to fall, take them off, and rub off the outward huſk, but do not wet them; then order them as Acorns; they come up the firſt ſeaſon, and affect a light loamy earth. I could wiſh for more of the ſeed of Horſe-cheſnuts from Turky.

The black Cherry or Geen is a tree that I love well in avenues and thickets; there is a ſort at Niddry-

caſtle, where I was born, ſeven miles weſt from Edinburgh, whoſe fruit is preferable to any Cherry: I take it to be a ſort of Heart, but 'tis a great bearer, which is a property the Heart Cherry wants: they are beſt ſtocks for ſtandard Cherries: the learned Evelyn and the ingenious Cook takes notice of this tree. But it is now found, that Heart Cherries grafted upon the bird Cherry, makes them more fruitful by far than when they are grafted upon the black Cherry or Geen-tree.

Gather their fruit when full ripe, in the beginning of Auguſt; eat off the fleſhy part, *i. e.* the fruit, and lay the ſtones to dry a little; then lay them by ſtratums with earth, which prepares them, if ſowed at ſpring, to riſe that ſeaſon, otherwiſe, they lye till the next: They affect a light ſharp ſoil, and, if you may, mix it with compoſt, and then it ſhall be fit for Cherries of all ſorts.

The fruit of the wild Service, commonly called Rons-tree, ripens in September, which you may eat or rub off by rolling in ſand; then prepare and ſow them as the wild Cherry or Geen-tree. They love a moiſt ground or ſhade not wet; if you incline to plant them in a better ſoil in avenues, methinks they would be very pleaſant, when ſpread over with their wimble-faſhion'd bright red fruit.

Of the Lime or Linden tree; the broad leaf'd, with odoriferous flowers is beſt; the ſeed ripens the beginning of October, but fills not well every year with us; and indeed we have but few that come to any conſiderable perfection; yet I have ſeen them bear ſeed at Hamilton: It ſhould be a little dried in an open room, and couched in moiſt ſand till winter paſs, and then ſown in a little ſhade in May when froſts are gone; becauſe as it comes not up the firſt year, ſo it comes up within a day or two of that time twelve months on

which

which it was ſown; and they muſt not be too much expoſed to the ſcorching ſun: They love a freſh loamy earth, and, in planting them, I adviſe you to cover the ſurface of the earth about them with litter, topt with earth, the firſt year at leaſt.

The Horn-beam may be ordered as ſmall Maple: They like a dry ground, and are for hedges.

The Hazel and Filberds ſeed or Nuts, are uſed as Walnuts: They delight in dry banks, nor are they ſtately forreſt-trees.

The Birch is a proper tree for much of our poor, dry and barren grounds: I never raiſed any of them by ſeed, in the wood they are ſo plenty by ſuckers, &c. Many of theſe handſome trees I have planted ſucceſsfully.

The ſeed of the Bean-tre-foil, vulgarly called Peaſe-cod-tree, ripens in October; and being kept dry all winter, and ſown at ſpring, it comes up that ſeaſon, and affects a moiſt ground, but ſweet.

The White Poplar, vulgarly called Abele, is a quick grower and pleaſant tree, ſo is Aſpen; they are eaſily propagated by cuttings, ſo is the laſt by ſuckers: ſee chap. I. § V. They love a good ſoil, very moiſt.

The Alder is very propagable, and loves the marſhes; and ſo is the Willow, Sallow, and Ozier, they all affecting a moiſt ground, and muſt be ſo kept till rooted.

But I come to greens; as,

The Pine-tree and Pinaſters, whoſe huſks you may expoſe to the ſun till they open, and ſeeds fall out, are to be ſown in March; but, if late before they come home, as they require the ſummer ſun to open them, if you then ſow, they cannot get ſtrength ſufficient to withſtand the enſuing winter; therefore keep them in dry ſand all winter, and ſow them in the ſpring, for they riſe that ſeaſon wherein they are ſowed: they

love a good and tender ſoil; they are ſomething tender while young, as all greens are; the great Pine is tenderer than Pinaſters, and nice in tranſplanting; therefore obſerve the rule in chapter VII. § II. ſhade and ſhelter in both extremities of heat and cold while young. But there is none ſo proper for us as,

The Scots Fir: many of their cones have I gathered any time between January and the latter end of March; lay them on a cloth to the ſun which opens them, to be ſown the latter end of April: they come up that ſeaſon, and love a ſoil with the Pinus. See how to order in nurſery: for they muſt be dibbled in again the firſt year, as ſpued up by froſts: they of any tree will grow on moſt ſorts of ground, if well ordered and prepared, and ſecured from drought the firſt year. And therefore help the ground where it is not to purpoſe, they will repay you or yours for your pains; if you plant in gravelly, or dry ſandy ground, mix it with clay and turf a large diſtance round about the roots; or, if in ſtiff and moiſt clays, trench eight or nine foot on each ſide round the compaſs of the roots, adding ſmall gravel, fat ſand, &c. and plant ebb. But enough of this in the laſt chapter.

The Silver Fir is ſo ordered; only it is tender while young and ſubject to blaſting.

The Pitch-tree is a hardy tree, and no wonder; ſeeing, as I am informed, it grows by nature plentifully in Norway.

The Yew is alſo a hardy tree, and only requires ſome defence while young; their berries ripen in November: rub off the fleſh or clammy ſubſtance, and lay them to dry a little, but not at the fire; then box them *ſtratum ſuper ſtratum* of earth and ſeed, placing them in the ſhade till the ſpring come twelve months; at which time ſow them, and then they ſpring: it affects a good ſoil, not ſtiff.

The

The Holly is to be uſed as Yew, for they lye as long; it is the moſt proper for hedges of all the plants in the world: next thereto is the Hawthorn, tho' not a green, whoſe ſeed ripens in October, and is to be uſed as Holly; for it riſeth not till ſpring come twelve months: and the better you prepare and mix the ground, the larger will they ſhoot. Nor let any imagine, that Holly alſo loves not dunged ground; nay, ſay they, poor and gravelly ſoil: But I know the contrary by experience.

I ſhall ſpeak of ſome ſhrubs in chap. VII. for I muſt leave them here, and come to ſhew you how to tranſplant and prune the ſtately Forreſt-trees.

III. In tranſplanting, remove with earth about their roots, if you can, eſpecially greens; at leaſt take all the roots up a good diſtance from the ſtem, by making a trench round, and be not haſty: then top all their roots with a ſharp knife, the ſlop tending down as a horſe-foot; cut off all the bruiſed and broken parts till you come at firm wood; top the ſmall roots like hair to make them ſtiff, ſo as they fold not when the earth is put in, and rot thereby: proportion the head to the root by thinning it, prune the ſide-boughs reſerving always ſome for tapering the tree: theſe you may cut cloſs and ſmooth by the body, ſlanting upwards, and they will ſoon over-grow the wounds, if the branch cut off be not great. Cut not the tops of Oaks or Beeches, they cannot endure it, neither any tree that you ordain for timber; altho' I have been neceſſitate to lop great old trees, whoſe heads could not otherways be conform'd to their roots, which neceſſarly are diminiſhed upon removal. But this is not the caſe of well-trained trees in a nurſery; neither muſt their long roots be top'd.

The rule for removing old large trees out of woods or other places, who were never before tranſ-

planted,

planted, is to make a trench at two ſides of the tree, at a conſiderable diſtance, till can you force the tree upon one ſide; then cut the top-root through, ſaving as many collateral roots as you can; leſſen its head, or lop it, if it will ſuffer, and ſo ſet up the tree again, and tread in the earth about it, as it was; let it ſtand two years to emit fibrous or feeding roots to nurſe it when planted out.

But to my nurſed trees again. When you remove, as is directed, carry them as quickly to their new quarters as you can: let the ſoil where you ſet them be as connatural to the nurſery as poſſible; ſee the laſt chap. for preparing grounds; and part I. chap. III. and IV. for the orderly ways of planting.

The beſt way is to make the holes a year before you plant, and in ſummer ſtir and turn their earth, that no weeds grow thereon: make them betwixt twelve and eighteen inches deep, and betwixt four and eight foot diameter, if ordinary trees: but, if the ground be bad, and not proper for the trees, then trench, mix and ply, till it becomes more agreeable.

When you plant, lay the ſurface in the bottom, and fill up the hole with fine earth, till it can only admit the upper part of the root to ſtand level with the ſurface; this is not to plant deep, for they that do, but cheat themſelves: then ſet on the root of the tree in the middle of the hole, and if no earth adhere to the ſame, make a little hut in the middle of ſmall earth, and lay the roots right ſpread round about with your hands, that none lye folded or diſorderly; then put in fine ſmall earth amongſt the roots, and ſhake and move the tree, ſo that the earth may go in amongſt them till no cavity or void be left to let in the air; ſuch roots as fold, raiſe up and level in their wonted poſture with your hands, ſhoveling on more earth,

earth, and tread gently; then fill one more, and tread well with your heels, till it be as far filled up about it as it ſtood in the earth before; make the bulk about level on the top, and juſt the breadth of the hole, and it will be about half a foot above the ſurface, if ordinary nurſed trees and good ground. You may put on the rounding-ſtring to make its edges circular and handſome, or, if you intend to make it like a geometrical ſquare, then ſtraight lines from ſide to ſide of a thicket will make up the bulks, that the whole will appear as walks and borders two ways: lay new horſe-dung, and litter or ferns above the bulk, ſo as it touches not the ſtem, covered with a little earth to keep it from drying; the rains will waſh in its ſubſtance, and refreſh the roots; beſides it keeps out ſummer droughts and winter froſts.

The firſt year at leaſt go through, now and then, and tread them right after winds. I am not for ſtaking trees, but for training them ſo as they may not need it, except you drive three ſtakes about each tree at the out-ſide of the bulk; then the double ſtraw-rops tyed from its body to all the three ſtakes will ſecure it; and, if you faſten croſs-ſticks, briers and thorns, this ſhall be a fence about each tree. Rub off buds that offer to break forth near the root, or any place where you would n • have them; but ſtill leave ſome here and there to ſtop the ſap from running too much in head; keep them clean of Suckers and weeds, by howing in ſummer, and delving, and looſening the mould about them in ſpring and autumn, *i. e.* at the two equinoxes; and tread them faſt again, as fearing drought and winds.

If you obſerve what is ſaid, you may expect clean and well-thriving trees, if right pruned, and well inclоſed.

The

The time of planting, ſee the ſeaſon for off-ſets, chap. I. § IV. Neglect not your time of early planting, that is, as ſoon as they leave growing, and before the froſts come on, and you ſhall ſee them far out-ſtrip theſe ſet in the ſpring: tho' I have often planted in the ſpring through neceſſity; but then I was always ſomething more than ordinary careful to defend them from the enſuing droughts, by covering their bulks, watering, *&c.* yet I prefer the ſpring for Fir and other ſuch greens, which therefore unavoidably require the ſame care.

IV. I ſhewed before how to prune in the nurſery while young; now continue it when planted out: whilſt they are ſmall, prune every year; when a little older, once in two years; then once in three or four, and never ſeldomer than in five or ſix.

And as you prune up the body till it arrives at the deſired height, leave ſmall branches here and there by the way, that it may bring greatneſs with its height, and be of conſequence the more able to ſtand; let never a tree get a greater head than its root is ſufficiently able to nurſe and bear; neither be raſh in lopping them, except they be already top-heavy, which brings crookedneſs; if ſo, cut at a crooked place, ſlanting upwards, clean and ſmooth, and train up the ſtraighteſt ſhoot again to be the tree; or rather if you can ſave its head by thinning, *viz.* cut the under-ſide thus at mid-ſummer, and ſlit the bark in the ſpring, ſo may it grow ſtraight and taper: purge ſtill the head when needful, and prune ſuperfluities; cut off all that croſs, rub, fret, and gall one another. Permit not trees to fork; train them with one ſtraight and taper body, and a handſome, round, pyramidical head. And when you prune, cut cloſs and ſmooth by the body or bough with the kniſe, or chizel and mallet; or, if the branch be great, cut with a ſaw, nicking it

firſt

firſt underneath, and ſmooth it with the chizel, ſo will it heal the better: but, if the tree be very old, and the branches great, ſuch will never be able to overgrow the wound; therefore if you muſt cut ſuch, do it at a little diſtance from the body, the wound declining to the horizon. Thus train Pines, Firs, Pitch, and theſe of the conical tribe in ſtories only, which method they naturally follow; you may cut out ſome of the greateſt branches of the under ſtory, but ſo as you leave them regular or equally furniſhed round; ſo may you leave one ſtory, cut out the ſecond, leave the third, *&c.* cut not their tops, yet you may crop ſome of their ſide-boughs, if the tree be top-heavy, and afterwards, as the tree gets footing, cut theſe clean off.

There are two ſeaſons for pruning ſuch as loſe the leaf: the firſt for theſe of little pith, is October and November, or any time in winter; and for theſe of ſoft wood and great hearts, and greens, let the froſts be over, and before the ſap riſe in them; except Firs, and other roſinous trees, which muſt be pruned in November; becauſe if pruned in March they bleed, and in September and October they have not given over growing.

The ſecond time is mid-ſummer, which is ordinarly about the end of June; this is a ſafe time to prune theſe of great pith, and ſuch as are unapt to bleed; but eſpecially for young ſhoots of this year: extirpate all ſuch buds and ſhoots as you deſire not to grow, and hereby you may make clean bodied trees, altho' never ſo apt to break out in boughs, as ſome Elms are. For the diſeaſes of all trees, with their cures, ſee chap. V. § VIII. and IX.

CHAP.

CHAP. IV.

Of Hedges or Inclosures.

SECT. I.

AS there is no country can have more need of planting than this, ſo none is more needful of incloſing; for we well know how vain it is to plant, unleſs we incloſe.

I ſpoke of brick and ſtone-walls in part I. chap. V. § V. Now for hedges, I prefer the Holly and Hawthorn, raiſed from ſeed, altho there are ſeveral others: mix not hedges, becauſe ſtrong growers overgrow the weak; neither ſuffer Briers, Brambles, Docks, or Thiſtles therein.

II. Your Hollies having ſtood two years in the ſeminary, and two in the nurſery, remove them by a trowel, or a ſpade, with a clod of earth at their roots, croping ſuch roots as appear without the clod with a ſharp knife, and leſſen its head by croping the ſide-boughs, but cut not its top; plant it in made up borders, or at the back of ditches, at a foot diſtance, in good earth. Let them ſtand two years untouched, except weeding; then cut their tops at a bud to make them furniſh thick, and ply their ſide-boughs to grow thro' one another, like ſlicing or feathering; and next year fall to work with the ſheers, cutting both ſides and top as we uſe to do with Box, *&c.* never ſupporting or binding any hedge, as is the cuſtom of ſome. Plant your Hollies in April, and, when ready for the ſheers, cut in May and July therewith, and ſo train them cloſs from the bottom, but neither too broad nor too high.

III. The Hawthorn having ſtood two or three years in the ſeminary, pull them up, and cut the ends of

of their roots, and their tops within four inches of the root, and plant them within the fence or back of the ditches in the good earth; delve them in ſpading, by ſpading all alongſt two rows, at a foot diſtance, ſtanding in equilateral triangles, ſtill thickning your border by adding good earth, &c. Let them ſtand three years untouched, except weeding, and repairing where any is dead; then fell or cut them off within half a foot of the ground, ſo will they ſhoot forth a thicket of young ſhoots, which next year may be train'd with the ſciſſars, as before is inſtructed.

IV. If you would plant your hedge on the face of a ditch, as in wet and tough grounds, then ſtretch a line on both ſides of the intended ditch, and rit with the ſpade hard by the ſame, ſlanting inward; for if the ditch be ſeven quarters wide, it muſt be five deep, ſloping to a foot in breadth at the bottom; then cut the turf or ſurface of your ditch, and lay a gang or row of the firſt ſpading along by the brink of the ditch, ſloping at the face according to the ſlop determined, with half a foot of table intercepting, becauſe ſo much will crumble down by the froſts, &c. On the top of that lay one row of quicks, their tops ſtanding up a little towards the ditch; cover their roots with fine ſmall earth, and lay another ſpading above them, and, if you will, lay another row of quicks above that, every one oppoſing the mid-interval of the other, and ſo cover on the reſt of the mould till the ditch be finiſhed; being always ſure to put good earth next the quicks, tho' you ſhould bring it from the high-way or a ridge of land adjacent to it; and every year ſcour the ditches, clapping up the earth about the quicks: Or a far better way is,

To caſt half of the earth that comes out of the ditches to each hand, and quicks in both ſides, and this will make an invincible fence; for then the

hedge grows up no both ſides of the ditch, and the gutter betwixt makes it frightful: but that I am againſt the common double, which is two ditches near one another, and the earth which comes out of both laid betwixt them with a row of quicks in the face of each ditch, is, becauſe here the quicks are obnoxious to the croping of cattle; beſides they take much ground, and the quicks are too much burdened with earth; rather, if you be for ſuch, make a little ſpace betwixt of plain ground, where you may plant the hedge.

V. But if you would have a row of trees planted round by your ditches, then make theſe two ditches the breadth of a walk aſunder, but parallel, and in that mid-interval plant one ſingle row of trees, and the two hedges at the back of the ditches: Here you ſhall have two excellent walks of ſhade, nor is the ground loſt between theſe hedges; you may have good hay, and in a large quantity. And in effect, this is the beſt way that ever I thought upon for incloſing and ſheltering our grounds and plantations: you may alſo make the interval betwixt theſe hedges wider, ſo as you may have two rows of trees.

VI. Now for fencing the quicks, in all their ſeveral ſorts, from the croping of beaſts, as indiſpenſibly neceſſary while young.

If the hedge be planted all along the bank or inſide of the ditch, then the ſtrong ditch with its earth caſt to both ſides will fence it; and if you think not that ſufficient, ſet, ſtake and raiſe a hedge on the top of the bank, or rather, which is indeed much better, cuttings of thorns ſet there in a ſpade-bit trench, well backed; or for want of theſe, back up the ditch with turf, which is like half-ditching. But all this time there is but one ſide of them fenced, and that next the paſture; therefore no beaſt can come on the other ſide to eat the foggage, except tethered horſes:

But

But if you make the hedge or hedges and trees betwixt the two ditches, you may caſt half of their earth to each hand, and back them as is ſaid, which fences from all hands moſt elegantly. And if you plant your hedges in the face of the ditches, the ſame backing on each hand will alſo fence them.

But where you plant trees at a great diſtance through your fields or parks, you may fence every particular tree by cutting a little trench round, four foot from the tree, and about two foot wide, facing it handſomely up like a ditch, laying one row of turfs or ſpadings above another, till it be three foot high from the ſurface, backing them with the ſmall earth or ſhovelings, battering inward to the tree: here the tree muſt be high planted; tho' the more the ſoil inclines to wet, or the ſowrer it be, plant ſo much the higher above the ſurface: you may ſtick ſome Briers or Thorns on the top of this ſtump.

CHAP. V.

How to propagate and order FRUIT-TREES.

SECT. I.

THE only fruits for this country are Apples, Pears, Cherries, Plumbs, and Apricocks, and Peaches at ſouth-walls, Currans, Gooſberries, Raſpberries, *&c.*

Before I begin, I ſhall premiſe ſome obſervations on graffing, *&c.* a ſure means to obtain fruits of the deſired ſpecies, and that in a ſhort time; for by taking the twig or bud of ſuch a ſort as is a good fruit, and bears well, and graff or inoculate into a proper ſtock, you are ſure to have the ſame fruit; becauſe the graff domineers, altho' it may have a little ſmack of its ſtock whereon it is graffed: and you may expect fruit,

becauſe it may have actually the fruit-buds, as being taken from a bearing tree. But if you ſow the ſeed, they will be long before they come to bear, and at length perhaps bring no fine fruit; and for the ſeed of graffed trees, they will not bring the ſame fruit; Pears and Apples will rather bring a fruit of the nature of the ſtock whereupon they have been graffed; and although you ſhould take a ſcion of the ſame, and graff in itſelf, that will not alter the fruit, nor better the tree.

We can alſo be ſure of the deſired fruit, by cuttings, layings, and circumpoſition, but from ſuch are always dwarfiſh and ſhort leaf'd trees, as wanting a main-root, which all ſeedlings have: Hence ariſeth one reaſon, why ſtocks ſhould be raiſed from the ſeed: Suckers are not ſo clean and luſty, therefore not ſo able to nurſe the graffs, and they are apt to ſend ſuckers again: Only I look upon Plum-ſuckers as very good, becauſe when they ſpring off a root at a diſtance from the ſtem, they ſtrike a good root of themſelves, very much reſembling ſeedlings: moreover you may graff on a root, or a ſtock ſprung off that root, as in chap. I. § V. and VIII. which is near equal to a ſeedling.

The ſeeds of Crabs, or wild Apples and Pears, may be fit to make ſtocks of for ſuch trees as are deſigned for the fields, or more rugged grounds; but for a cultivated ſoil I would chuſe the ſeeds of finer fruits: and ſo the Julian-plum is the beſt ſtock for Apricocks; or for want thereof, any other white Plum with great ſhoots, altho' it holds on any Plum; but we reject itſelf for a ſtock, as being too ſpungy, and not ſo durable: but Peaches and Nectarines take only beſt upon Peach-ſtocks; ſo Cherries on Geens, and Plums upon Plums.

Gooſberries

Gooſberries and currans need not graffing; they do well by ſuckers, layers, and cuttings beſt of all.

To make Dwarf-apples graff or bud on the paradiſe, the Dutch Creeper or Bittern-ſtock does beſt, or any that hath Burry-knots, Codlings, Redſtreaks, &c. Dwarf-pears on the Quince; but no Pear holds well on it, that I have tried, excepting the Red-pear, Achan, and Longevil; but you may re-graff for varieties: And if you be very curious for theſe ſtocks, which I am not, you may cut them at the ſpring, when ready for graffing, within two inches of the ground; and at Auguſt come twelve months, inoculate in that young ſhoot, and perhaps they will proſper the better. But I think graffing in the roots of Pears will produce dwarfs.

Dwarf-cherries may be graffed on the Morella, or on the common red Cherry; or on that red Geen ſpoken of in chap. III. § II. which is more dwarfiſh than the black; but they do beſt for dwarf when they are graffed on the Corniſh-cherry.

II. The mellow, warm and light ground is beſt for fruits; and altho' the beſt, warmeſt and lighteſt land yields moſt excellent corn, yet the ſtrong, ſtiff, cold or moiſt, yields not ſo good fruits, plants, graſs, hay, &c. Apples affect a pretty rich loamy ſoil, tho' they will bear in clay, mix'd with lime, dung and turf.

Pears will proſper well enough, where the ſoil is mix'd with gravel; but both Apples and Pears are better reliſhed in warm grounds that are not over moiſt, than in cold and wet: yet there are ſome grounds that have ſweet moiſture, others ſowr, which laſt is very bad, and therefore muſt be helped by draining, and application of proper medicines; ſee chap. II.

Cherries, Plums, Apricocks, Peaches, affect a light ſharp ſoil, thoroughly prepared and mixed with rotted manures. As to their propagation;

By graffing are raiſed Apples, Pears, Cherries, Plums, Quince, Medlar, Walnut, Cheſnut, Filberd, Service, &c.

By inoculation or budding, Apricocks, Peaches, Nectarines, Almonds, Gooſberries, Currans, Apples, Pears, Plums, Walnuts, &c.

By ſuckers, Currans, Gooſberries, Barberries, Raſpberries, Quince, Vine, Fig, Mulberry: It is the white Mulberry that feeds the ſilk worm; but that's to little purpoſe here.

By layers and circumpoſition are all ſorts raiſed.

By cuttings, are Currans, Gooſberries, Vine, Quince, Apples, eſpecially theſe with burry-knots; but Gooſberries, Currans and Vines do beſt.

By nuts and ſtones, are Walnuts, Cheſnuts, Filberds, Almonds, Peaches, Plums, Cherries.

By kernels or ſeeds, are Apples, Pears, Quinces, Gooſberries, Currans, Barberries, Vines, Mulberries, &c.

I have told whereupon to graff Apples, Pears, Cheries, Plums, Apricocks, Peaches; and as for the Quince, you may graff it on itſelf, or on the Hawthorn; Almonds on itſelf; Medlars on Pears, or on the Service; Filberds on the Hazel; Service, Walnut, Cheſnut, Gooſberry, Curran, all on their own kinds.

III. In raiſing the ſtocks, always obſerve, That Apple and Pear-ſeed muſt be ſeparated from the fleſhy ſubſtance, and ſpread to dry a little, eſpecially the Cyder-marce, leſt it heat; you may roll it in ſand to help the ſeparation; keep it in a couch of dry ſand till winter paſs, then ſow it as ſoon as the froſts are over; it comes up that ſeaſon.

For raiſing Cherries or Geens, ſee chap. III. § II. Peach, Plum and Almond-ſtones, muſt be uſed in all caſes as Cherries; only you may break the Peach-ſtones.

Uſe

Uſe the Quince-ſeed as Apples. As for the reſt, I have ſhewed how they are increaſed, in the laſt ſection, and how to perform the ſeveral ways in chap. I.

But you muſt prepare a ſeminary and nurſery, as before for forreſt-trees, ſee chap. III. § I. Sow every ſpecies by themſelves, keep them clean of weeds; and the next, or ſecond year after the ſeeds riſe, if they ſhoot luſtily, draw out the biggeſt firſt; tranſplant them into the nurſery in ſingle rows, at two foot interval, and half a foot in the rows, for conveniency in hoeing, graffing, pruning, *&c.* and obſerve to prune the root and ſide-branches in planting, as I directed with Forreſt-trees: only, when you have got them to a convenient height for graffing, you may cut their tops, to make their bodies ſwell the ſooner; altho' this be not permitted with Forreſt-trees: however graff and inoculate while the ſtocks are young, before they be an inch diameter, and they will ſooner heal the wound: let them have a year's ſettlement in the nurſery before you graff; but you may inoculate that ſame enſuing ſummer after planting, eſpecially if they be very free and luſty. Next year after graffing remove them to a wider diſtance, *viz.* three foot one way, and a foot the other; prune their roots at every removal, that they may provide for a well-ſhapen head; cut them near now while young, if you would have all their branches of an equal greatneſs, and of proper order, as I ſhall inform you.

In ſetting your ſtocks in the nurſery, I preſume you will ſet every kind by themſelves, *i. e.* Pears with Pears, and Apples with Apples, *&c.* And, when you graff or bud, write down in your nurſery-book their ſpecies as they ſtand. *viz.* Begin at the end of ſuch a nurſery, and ſay, The firſt row is graffed with ſuch a ſort, and ſo forth; and, if you have more than one in a row, then ſet in a ſtake betwixt each ſpecies,

and

and ſo write thus; From ſuch an end of ſuch a row, to the firſt ſtake, are ſo many of ſuch a ſort or ſpecies; thence to the ſecond ſtake, and ſo many to another, *&c.*

IV. When you tranſplant fruit-trees into orchards, do as I directed with forreſt-trees in groves; plant not deep, neither trench too deep; but tempt the roots by baiting the ſurface with dungs, to make them run ebb within the reach of the Sun and ſhowers: therefore mix the earth in the holes, which ſhould be ſix or eight foot diameter, with rotted nolts-dung, and earth well turned, ſweetned and prepared, as in chap. II. cover, delve and hoe their bulks, as in chap. III. § III. And, for further improving and keeping your fruit-trees in good caſe, ſee § VI. of this chapter. Prune their roots at every removal, as in forreſt-trees: experience forbids me to make exception of the Peach, or any other, as ſome do: always proportion their heads to their roots by pruning: but here *Note*, that, as forreſt-trees are trained up with high bodies, and unlopt heads; ſo fruit-trees with low bodies, their heads lopt, and branches topt; and therefore are eaſily proportioned.

Standards of four years old, may be planted out of nurſeries into orchards, and alſo Wall-trees of two years old.

The ſeaſon of the year is as ſoon as they give over growing; if the leaves be not off, cut them, except a little tail of their ſtalks: it is true you may plant any time in winter, the weather being open; but rather let the froſts be over, and the ſpring approaching, if you have miſſed the fore-end of winter, which is the better ſeaſon.

For Standards, are Apples, Pears, Cherries, Plums, Gooſberries, Currans, Barberries, Quince, Walnut, Cheſnut,

Cheſnut, Filberd, Service: But I think all theſe deſerve not a place in the orchard.

For walls are Apricocks, Peaches, Nectarines, Almonds, Vines, Figs, Currans, Apples, Pears, Cherries, plums, *&c.*

On the South-ſide of the wall, plant Apricocks, Peaches, Nectarines, Vines, *&c.* On the Eaſt and Weſt-ſides, Cherries, Plums, Apples, Pears, *&c.* On the North-ſide, Morrella-cherries, ſome Pears, ſome Apples, Currans eſpecially, and Raſps, *&c.*

When you elect them in the nurſery, hang ſticks tied at them figured, and write the ſame figure on the paper at their name, to diſtinguiſh their ſpecies; and afterwards, when planted, write them as they ſtand.

V. Begin betimes to prune your fruit-trees; ſpare them not while young; reduce them into a good ſhape and order while ſuch, ſo will they not only ſoon overgrow the wounds, their branches being but ſmall, but alſo, when they ſhould come to bear fruit, ſhall not need to be cut ſo much; only purge them of ſuperfluities; and this is the way to make trees fruitful as well as pleaſant.

Some ignorants are againſt pruning, ſuffering their trees to run and ramble to ſuch a head of confuſion, as neither bear well nor fair; for the root is not able to maintain ſuch, far leſs fruit too, and therefore is their fruit ſo ſmall and imperfect: in the mean time the tree ſpends its ſtrength, and ſo cannot live long, nor make good ſervice in its time; yea ſometimes the root is not ſo much as able to bear ſuch monſtrous heads. I knew one windy day proſtrate above half a ſcore of ſuch in a little orchard.

Others again that are for pruning, uſually run on the other extreme, by cutting too much and untimely; and ſome ſparing what they ſhould cut, and cutting ſuch as they ought to ſpare: but the general er-

ror,

ror, even amongſt the learned, is, that they ſpare them when they ſhould prune, *viz.* the very firſt, and ſecond year eſpecially; yea the firſt five or ſix years, and then they fall a-maſſacring; at which time the branches being grown, ſome of them greater than others, now run away with all the nouriſhment from the ſmaller, in ſo much that no man can reduce them into order again, having thus neglected the time; altho' you ſhould endeavour it by cutting deep, or exterminating theſe great branches, which, I confeſs, is the next remedy; but then as theſe wounds bring cankers, hollowneſs, *&c.* ſo doth the work retard their bearing fruit. And indeed it is about the time that trees ordinarly begin to bear fruit that theſe unſkilful men begin to prune; and the more they are thus cut in the head, the more they ſpring out to wood, and the leſs fruit they bear. But experience has taught me to begin while young.

And when you do begin, conſider on the height of the body; for, as high trees are unprofitable, ſo too low trees in orchards are inconvenient: for Apple and Pear Standards, two or three foot: Plum and Cherry, three or four foot; Dwarf and Wall-trees, half a foot; there cut the top that runs ſtraight upwards, making it to ſpread out in branches round; ſuffer no branch to aſpire beyond others in height, nor any to croſs, rub or gall one another; and whatever branch or twig you cut off, cut cloſs and clean by the body or branch, except in the caſe of old trees and great branches, as I obſerved in pruning forreſt-trees: and in toping of branches, cut cloſs and ſmooth immediately above a leaf-bud, ſlanting downwards to cover the wound; and when you prune, ſpare the fruit-buds, the full ones I mean, except you ſee them too many; then purge by the knife: likewiſe, if afterwards you find more fruit knotted than the

ſhe tree can be able to nurſe to perfection, thin them in time.

But your firſt work is to proportion the head to the root by pruning; cut the tops at a convenient height, that the tree may grow equally furniſhed round; for cutting, as it diminiſheth, ſo it forms and ſhapes the head, inſomuch as it furniſheth with new young ſhoots, that may be trained as you pleaſe.

Standards ſhould have but four arms breaking out for a head, opening equally round; theſe dividing into branches, and again ſubdividing into twigs. And, that you may the better underſtand what to cut, you may ſtand under, go about, and look up through the tree where you may ſpy ſuperfluities; keep them clear, void, open within like a bell, and level on the top; make ſome larger opens towards the South, for the entrance of the ſun-beams; let no branch grow croſs through the heart, nor ſhoot ſpring up therein; minding always to prune ſuch as croſs, rub and gall one another, as is before-noted; and any branches, ſhoots, or twigs, that grow not the way you would have them, cut them at the place whence you think they will ſend forth ſhoots, which may lead them the way you deſire them; cut cloſs, ſmooth and ſlanting, at the back of a leaf-bud tending that way. By this I bring trees to order.

Wall-trees eſpecially ſhould be cut near while young, that they may ſend forth ſmall ſhoots, for furniſhing your walls from the bottom equally; and if you continue to top them every year at a convenient height, perhaps about half a foot above the laſt, that will make them ſhoot all their branches of an equal uniformity of greatneſs, height and thickneſs, ſo that no long, bare, or naked branch may be ſeen there, neither one or two great, and all the reſt ſtarved and ſmall; which is the common fault of our Wall-trees,

and

and is occaſioned through neglecting to cut while yunog, even the firſt year, as above.

But altho' a tree may be right begun, and ſo going on, yet one years neglect, or wrong pruning may ſpoil it. For as I was once pruning Wall-trees, an ingenious perſon ſtanding by, ſaid, I cut them too low; alledging thereby, the wall ſhould be long uncovered, deſiring me to cut them a little higher. I told him, that was wrong; but, to ſatisfy him, I cut two of them about eight or nine inches higher than I deſigned, or ſhould have done. The next year theſe two trees left about a foot naked round, and above the ſame crown'd like neſts, while the reſt were equally and orderly furniſhed; when he beheld this, he changed his opinion, and I was obliged to cut exactly where I ſhould have done the preceeding year, which was now a little below the middle of the naked place, and this put them ſeveral years behind the reſt of bearing fruit.

You may nail them at Michaelmas that year of planting, and continue ſo to do at the ſeaſons hereafter deſcribed: Prepare double plancher-nails, and tags of hats, which is better than leather; ſhape the tags about half an inch broad, and betwixt three, four and five inches long, making a gaſh with the knife near the ends by folding, to put through the nail; then ſpread the tree, laying, plying and nailing on every individual branch by itſelf, all at equal diſtances from one another, not cloſs in one place, and wide in another; and let none croſs the other; the ſuperfluous, and theſe that will not ply eaſily, and the exuberant or luſty that robs the reſt, muſt be cut away.

Well ply'd trees will appear like a peacock's train ſpread; drive the nail but half way in, and on the upper ſide of the branch, elſe it will lean and gall; at every nailing alter the old nails, and beware of pinching the

the young branches by making the tags or binding too tight.

The time for pruning old planted and hardy trees, is any time betwixt the fall of the leaf and the ſpring; but let the froſts be over before you prune thoſe that are new-planted, young and tender, and before the ſap riſe; otherwiſe the froſts will penetrate the wounds, and make a ſore: But if you muſt cut before the froſts, becauſe their heads may be obnoxious to the winds, ſuch are ordinarly the new planted Standards, then you may cut a little at ſpring, and cut off cleanly the pieces left, as is before-noted. Alſo let the froſts be over before you prune your wall-trees; only I uſe to let Peaches bud forth a little before I prune them, otherwiſe pieces of their branches ſometimes periſh after the knife.

And beſides, you muſt rub off all unneceſſary buds, and pull up ſuckers and weeds from the roots: you muſt alſo give all your trees a midſummer pruning, which is ordinarly about the end of June, and beginning of July, a good time to cut any ſhoots of this year: but I prefer pinching the ſmall branches which are to be taken off with your finger and thumb; becauſe if they are cut with a knife, they will ſoon prepare to ſet out new branches, or at leaſt new buds, which they will not attempt to do when they are pinched: ſuch ſhoots or buds as tend not only to the deforming your trees, but to rob them of that ſap, which may be otherwiſe ſpent in nurſing the tree and its fruits, thin and purge theſe gently, to let in the ſun, but not to ſcorch the fruit: This is alſo the time of furniſhing your trees with pedeſtals or bearers; but the ſpring is the time of cropping or cutting their tops, until the wall be covered; then crop at both ſeaſons: Therefore in re-pruning, ſave as many of the liklieſt ſhoots as are well placed, and cut them at the

third or fourth bud from the tree; but cut quite off the luſtieſt and greateſt of this years growth, which ignorant gardiners ſpare; and nail up ſuch as are filling up the defects of the wall.

You may go through them in harveſt, and purge the fruit of ſuperfluous leaves, which hinders the ſun; but do it ſo, as there may be leaves ſufficient to ſcreen the fruit, and cut quite off the luſty ſhoots of this ſecond ſpring, which rob the tree and fruit.

As for Gooſberry and Currant-ſtandards, train them to a foot ſtem, with a handſome round, but thin head: theſe at walls, half a foot ſtem, with a well-ſpread head, ſupported with rods laid acroſs, faſtened with nails and tags. Raſps may be in ſhadowy borders or beds, three feet row from row, and two feet plant from plant, kept clean of ſuckers, weeds and dead wood, and dunged and dug once every two years.

But becauſe ſome Years, in ſome places, we have ripe Grapes, eſpecially what goes under the name of Frontiniac; therefore if you think a tree or two of them worth your while, plant them at a ſouth-wall, in a pure and fine mould, not wet, ſowr and crude, but a light ſweet ſoil, mixt with ſome cow's dung, rotted in heaps with the mould. Plant ebb, and trench not deep; prune them every year, low in February, and at midſummer. Cut off the luſty young ſhoots and tendrils, betwixt the ſecond and third joint above the fruit, and in Auguſt purge it of ſuperfluous leaves, but reſerve ſo many as may ſcreen the fruit a little.

There are ſome ſorts of fruit-trees that will blow and bear themſelves to death, when young or middle aged; from ſuch, cut moſt of the blowing buds, and thin the head to make it ſhoot again.

I got ſome Cherries, and other ſtone-fruit from Holland, which took this decay; wherefore in the ſpring,

ſpring, I cut off the blowing buds and the branches, near the place where the tree headed, reſerving only ſome buds for receiving the ſap, in caſe they ſhould have put forth at the middle of the body, or a little above ground; this made them ſhoot to wood. Therefore I conclude, that by this, and delving about, you may help ill-thriving trees.

There are alſo ſome Apples and Pears, that will be full of falſe-bearing buds, that do not blow: ſuch have got more head than the roots can well maintain, and conſequently have not ſtrength ſufficient to ſpare ſap for bloſſoms, far leſs for fruit, which by pruning and thinning the head, and by ſlitting the bark of the body in the ſpring, may be made afterwards to bear well, when they have put forth new ſhoots at the head.

Some trees there are that will not bear of themſelves till they be old; but if you cut off the head of the ſhoots, aſſoon as ever the ſpring-ſhoot is over, which is at true Mid-ſummer, and take out ſome great boughs then, if you mind your time, and do it with diſcretion, you may force that tree to put forth blowing buds, and blow and bear the year following, as I ſhall inform you in the next Section. But,

VI. One main buſineſs is to incloſe your plantations; avoid planting too deep, too dry, too cold, or too moiſt, and guard your orchards from winds, by planting two rows of foreſt-trees, at leaſt round without the wall, the breadth of a large walk, or rather fifty feet therefrom; for trees at that diſtance give greater protection from winds than thoſe planted nearer to the orchard walls, with thickets of the ſame on the Weſt, North and Eaſt, but eſpecially on the Weſt; yet mind regularity, as alſo obſerve my method of planting and pruning, and ordering their bulks of ſix and eight foot diameter: But when the

trees grow old, and their feeding roots ſpread far abroad, you cannot reach to feed them with dungs in this narrow compaſs; therefore enlarge it, or otherwiſe confine them a little ſooner, and hinder their gadding too far, by digging a circle round the tree, perhaps eight foot diameter, and cut all the roots clean off that hath run out, applying freſh and ſweet mould, ſo ſhall they emit fibrous or feeding roots in thicket, which may be ſupplied with refreſhments once in two or three years, as ſhall be required; and thus the roots will cauſe trees that are apt to ſpend more in wood than fruit, alter therefrom, and the ends of the roots cut off, and their but-ends raiſed up a little, will ſerve as ſtocks to graff upon. But this method does not now obtain, as there are plenty of ſtocks now in our nurſeries.

VII. When you would enrich your worn out plantations, if the ground be poor and dry, add well rotten dung prepared and mixt with ſoil: the water that ſoaks from a dung-hill is excellent; for it will mend the roots, and enrich the trees. If the ground be cold and moiſt, add Pidgeon's dung, or aſhes and ſoot; which is alſo excellent, if it be leopared with unſkilful dunging, or by noiſome weeds that grow about ſuch roots where the owner is a ſluggard, and hatches or neſtles moles, mice, toads, &c.

If you obſerve the premiſes, you may prevent their diſeaſes, ſuch as ill thriving, &c. but if you have, or do neglect, and the diſeaſes are begun, for inſtance cankers, cut them clean out, covering the wound with a plaiſter of cow's dung and clay compounded: if the bark be peeled by hares, rabbits, or mice, apply a plaiſter of the ſame; but 'tis better to prevent the laſt three, by ſwaddling the trees with ſtraw or hay-ropes, unlooſed in ſummer, and renewed every winter, if your fence cannot guard them. Ill taken off branches,

and

and branches broken or rotten, muſt be cut off clean and ſmooth. If any trees be bark-bound, which is the miſery of many, and eſpecially foreſt-trees, ſlit them in ſpring through the bark on both ſides, with a ſharp knife, from the head to the root, and delve about them; otherwiſe raiſe and plant them ebber, if too deep; which is the common cauſe of this diſeaſe, together with bad incloſures.

If jaundice affects them, cut off clean the diſeaſed wood; if moſs, ſcrap or ſinge it off: but 'tis in vain to attempt the cure, until you firſt remove the cauſe; which you will find to proceed from ſome malignity at the roots, whether the diſeaſe be bark-binding, cankers, *&c.* and this moſt commonly happens by ill planting, and not incloſing, as among clay, water, impenetrable gravel, *&c.* Water muſt be drained; 'tis an intolerable evil: cold clays, or ſtiff and hard ſoil muſt be trenched and mixed with dungs and ſoils often ſtirred and fallowed, as above is directed. And if you would have trees to proſper, obſerve their nature, and wherein they moſt delight, and ſo apply and help them accordingly.

VIII. And for deſtroying vermin, there are traps for moles of ſeveral forms: beſides you may watch and delve them up with the ſpade. And for mice, you may have traps from Holland, or for want thereof, pots may be ſunk in the earth where they haunt, till their mouths be level with the ſurface, half full of water, covered with a little chaff, wherein they drown themſelves; and ſo do toads, aſps, *&c.* Caſt away the earth where the ants lodge, ſupplying its place with ſtiff clay: place cow-hoofs for the wood-lice and ear-wigs to lodge in all night, and ſo ſcald them early in the morning. Pour ſcalding water in the neſts of waſps, and hang glaſſes of water mingled with honey, where you would not have them frequent.

Daſh water on the trees for caterpillars, by the hand-pumps which we get from Holland. Gather ſnails and worms; ſhoot crows, pyes, jayes, and ſpread nets before your wall-fruit for their preſervation.

See Part III. how to gather and preſerve fruit, and how to make cyder, *&c.*

CHAP. VI.

Of fruits, herbs and roots for the Kitchen.

SECT. I.

ALL the fruits whereof I ſpoke in the laſt chapter, are for the kitchen or table, but they grow on trees or ſhrubs; yet there are ſome which fall in here, the tendereſt whereof are,

Melons; theſe you muſt raiſe on early hot-beds, the method of making whereof ſee in Chap. II. § VII. A full deſcription of the Melon, Cucumber and Pompion culture is given in the kalendar for the month of February.

Strawberries are a very fine and delicate fruit, and are eaſily increaſed, but beſt by the ſmall plants taken from their mother plants in Auguſt, by which means they will be ſufficiently rooted, ſo as not to be ſpued out of the ground by the froſts in winter. Dung, delve, mix and prepare a rich midling warm ſoil; prune their roots and tops, and plant them in ſtraight lines, four rows in a bed of four feet broad, and ſuffer them never to over-run, but keep each ſtock by themſelves, ſtill taking off all their ſtrings; for tho' ſome people propagate them from their runners, experience taught us that practice was quite wrong, thoſe runners producing nothing but runners, blind flowers and no fruit. Weed and hoe them well; and in September cut them within two inches of the ground, and lay cow-

dung

dung over the bed, if in a ſandy ſoil, reſerving their tops free; but rotten horſe-dung is beſt, as they require a rich loamy ground in a warm ſituation; this will much improve them, ſo as they will not need renewing for three or four years; but longer than that ſpace of time they do not proſper, but turn ſtocky and barren.

Artichokes are a fine and laſting fruit, and are increaſed by off-ſets chiefly planted in the ſpring, in a fat and well cultured ſoil, light and warm, enriched with ſheep or horſes dung; plant them in ſtraight lines, about three foot diſtance, having prun'd their roots, and cut their tops within half a foot; water them, if needful, and ſtill cut away their under and hanging leaves, and hoe the weeds as they begin to peep; when their fruit is ſpent, cut them within three inches of the ground, and delve and cover the plot over with old rotten dung, keeping their tops free: in April delve down the ſame, and take off their ſuckers, ſliping them off carefully, leaving two at moſt to each ſtock for bearing, and they will flouriſh three or four years; but it will be proper to make new plantations every ſpring for a ſucceſſion of crops.

Great Beans muſt be planted early in the ſpring, aſſoon as the great froſts are over, in a deep rich ground, at two foot interval, and half a foot in their rows; theſe when full ripe, cut and bind in little ſheaves for ſeed, and lay on trees to dry.

Plant Kidneys in April, in a light and warm ſoil, ſupport them with ſticks: the oriental Kidney is the beſt ſort.

Peaſe that you would have early, ſow in the full moon of November, if in a warm place; but do not truſt too much to them: ſow in February, and hence monthly till June, in an open, light, warm, dry ſoil, that you may have them till the froſts ſurprize them;

them; and if they ly on the bare ground, they will ſooner ripen by reflection: but if you would have them fruitful, ſet ſticks amongſt them while young for their tendrils to climb on, and keep them always clean of weeds: when ripe, you may eaſily win ſome for ſeed; but ſow not every year on the ſame plot; to change the ground improves them. I prefer the ſetting them by lines, two rows in the bed, as Part I. chap. V. § II. make the holes exactly by the lines, with a dibble an inch and an half deep, and two inches diſtance, another, or the ſame hand fallowing, and put one in each hole; then ſmooth the bed with the rake-head, which fills the holes, and covers the Peaſe: one pound makes more ſervice thus than three otherwiſe; 'tis ſoon performed, and they ſpring orderly.

II. Of Sallads and Pot-herbs; the choiſeſt ſallad is Aſparagus: Sow its ſeed in March in good ground, and tranſplant that time twelve months into an exceeding rich and well mixed ſoil of rotted dung and light earth; taking care that this dung be ſix or eight inches below the roots of the Aſparagus: You may ſtretch lines along and croſs the beds, and mark with the edge of the rule; then gather little huts of earth at the croſſings, whereon you muſt ſpread the roots of your Aſparagus, two on a hut; but do not top their roots: you may perceive their points are like the runners of liquoriſh; then cover the ſets with very rich earth, three inches over, which has been lying a year in compoſt: they cannot abide wet grounds, and weeds will quite deſtroy them; at the approach of winter cut their ſtalks, and cover their beds with old rotted hot-bed dung; the winter rains will waſh in its ſubſtance to their roots: at ſpring, before they peep, remove it, and looſen the earth amongſt them with a fork, and cover them near half an inch with the mould raked and leveled, but do not tread on them. Follow this direction yearly, and in

four

four or five years it will be excellent for cutting; cut the bigeſt and tendereſt a little within the ground; but hurt not theſe read to peep. The ſeed is ripe when red.

You may have early Aſparagus, if you plant ſome ſtrong roots on your early hot-bed; which about a month hence will ſpring, and then die off.

Purſlain may be ſown on the early hot-bed; it cannot endure deep interring; ſow it on a fine mould like duſt, and only clap it a little with the ſhovel; thence on the cold bed, but in fat and fine ſoil, through the ſummer in drills, for convenience of weeding and cutting; and if you pleaſe, tranſplant it when two inches long; reſerve the early ſown for ſeed, till their pods grow blackiſh, then pull and hang them to dry, and rub out.

As you ſow Purſlain, ſo muſt you Lettice, by ſeeds only, at the ſame ſeaſons; but the winter or corn-ſallad in Auguſt: they love a fat ſoil ſomething moiſt, that for winter more dry. Suffer theſe for ſeed to run up, and only clean off the under and withered leaves. 'Tis ripe when it begins to fly with the wind, pull it, and lay it on a cloth to perfect; then rub it out in a dry day.

Sow Creſſes at the ſame ſeaſon: And plant Terragon by off-ſets in the ſpring.

The ſmall Chervil by ſeed, as Creſſes: As alſo, Burnet; but it continues many years, ſtill yielding ſeed.

Sampier grows at the ſea-ſide in Galloway, but not ſo well in our gardens.

Succory and Endive muſt be ſown by ſeeds, in June and July; when they have five leaves, tranſplant them into a rich border, watering them well until they root; ſo ſoon as they turn buſhy or thick of leaves in the middle, tye them up regularly with matt-

ſtrings

ſtrings in dry weather, watering well; and in three weeks they will be fit for uſe, by ſhowing you their white leaves in the middle, twiſting out below the tyings; then lift them, taking off the green leaves and the inner white leaves, they make a fine ſallad.

Sorrel riſes by off-ſets, ſome alſo by ſeed, in the beginning of April, in a good fat ſoil, a little ſhade, ſix or ſeven rows in the bed, weeded all ſummer, and cut near the ground in September. In two or three years replant it in another place, for it ſoon impairs the ground of the place appropriate for it.

Broad leaf'd Spinage grows by ſeed only in February and March, but the narrow leaf'd ſown in the beginning of Auguſt, is the moſt profitable; cut it in the beginning of October, and it will ſpring afreſh, and be ready for ſpring-ſtoves; then reſerve ſome uncut for ſeed: it proſpers well in a very fat earth, not too dry.

And ſo do Beets, which are alſo propagated the ſame way; ſow them in the ſpring only.

Sow Beet-card in the fatteſt land, and when ſomething ſtrong you may tranſplant: They have ſeed the next, not that year wherein you ſow them.

Order Burrage as Spinage; it is alſo an annual: ſo Bugloſs; but it continues many years.

Marygold may be ordered as Burrage, and white Orach as Spinage.

Parſley is raiſed by ſeeds in February and March; they bring forth their ſeeds next year, whereby they muſt be yearly renewed.

Sow Sellery in a light fat ſoil, eight rows in the bed, as Parſley; it continues long, yielding ſeed yearly after the firſt; and ſo doth Smallage and Alexander: they may be blanched as Succory and Endive, viz. Sellery ſown in March, you may tranſplant at midſummer in a very fat and fine earth, half foot deep furrows, three foot between the rows, and four inches in the rows;

and

and as it grows up, gather the earth at its ſides from the intervals, leaving the top free; and ſtill as it grows, earth it up in dry weather, ſo ſhall it be blanched for a winter-ſallad.

Raiſe Garlicks and Shalot by off-ſets in March, in a light and fat ſoil, eight rows in the bed: I uſe neither cutting nor twiſting their ſtalks; but when their fibres begin to rot in the latter end of July, take them up, and ſpread to dry a little, and houſe them in a dry room with board-floor for uſe, and replant in September.

Leeks by ſeed in April, in a fat ſoil, though ſomething ſtiff; in June you may thin them by tranſplantation; prune their roots and tops, ſet them at three inches diſtance, and continue to crop them till October. The Engliſh or rather Scots ſeed is beſt.

Raiſe Onions by ſeeds in March, in a rich, warm, light mould, well mixed with rotted compoſt and ſifted pidgeons dung; give them a thin coat or covering of earth; ſow alſo in the beginning of July for Shibols; 'tis not worth the pains to win their ſeed.

Plant off-ſets of Syves in ſpring, ſix rows in the bed, in a rich and low ground.

Colly-flower is a fine Colly; ſow it on the early hot-bed, for 'tis hard to get winter plants through to purpoſe; ſow thin and ebb, and carefully preſerve them from colds when young: water but gently, and that only in the moſt dry ſeaſon: when their leaves are three inches broad, tranſplant them into a very fat and well mixt ſoil, at two foot diſtance; prune their roots, and if any worm knots, cut them away; and in ſetting, keep their hearts immediately above ground: all along keep them clean of weeds, under-hanging and withered leaves, and keep ſnails from them. If the ground and ſeed be good, you may expect good heads; which if you ſpend not altogether before froſt, which

ſpoils

ſpoils them, take them up in a dry day, and tye them in pairs to hang in a dry room for uſe. The beſt ſeed comes from Candia.

There are many Cabbages; ſow the Savoy, and ſuch tender ſorts, as Colly-flowers, altho' not quite ſo tender; ſow the great, white and red, in the full moon in July; plant them forth in October at three foot diſtance, in well dunged ground; ſet ſome alſo in March: but then the gardiner finds multiplicity of buſineſs; therefore 'tis his wiſdom to put as much work by hand as can ſuffer it, at leaſt to have all his grounds fallowed before winter. You may hang up your Cabbages in November, as Colly-flowers; but plant ſome of the beſt and hardeſt for ſeed, up to the neck: When they ſhoot, ſupport with ſtakes and ropes; when full, cut and lay on a cloth to perfect: but chooſe the upright ſtem in the heart and its branches, rejecting the lower branches.

Catch ſnails and worms that gnaw the young ſprouting plants, and ſet nets for birds at the ſame time. The reaſon why old Cole is full of green worms, is dry poor ground never weeded; or otherwiſe unqualified dungs, and unſeaſonably applied: If they will trench, mix, *&c.* as in chap. II. that their ground may be clean and ſweet, they ſhall ripen accordingly.

Common Colworts are uſually ſown at ſpring, planted in ſummer, and eaten through winter, and at ſpring, when other green herbs are ſcarce, you may alſo ſow and ſet them with Cabbages, and reap their ſeeds accordingly.

III. Of ſweet herbs, as,

Clary; raiſe it by ſeeds and off-ſets in April, at which time, you may ſlip and ſet Tanſy, Sage, Coſt, Mint, Balm, Winter-ſavory, Thyme, Penny-royal, Wild-marjoram, Maudlin, Fennel, *&c.* Prune their

fibres

fibres, and plant in a garden ſoil, ſix rows in the bed: they all continue long, but cutting their tops in growing time, makes them more durable; and cut them all within an handful of the ground in Auguſt, that they may recover againſt winter. You may likewiſe ſow the ſeed of Fennel, Thyme, Winter as well as Summer-ſavory, Dill, ſweet Baſil, &c. in April, in a warm well cultured ſoil, ordering them as above; the three laſt are annuals. If you would have ſweet Marjoram early, raiſe it on the hot-bed: the ſweet Baſil requires the ſame: ſow it alſo the latter end of April, in a warm fat ſoil, eight rows in the bed: you may ſow it in July, and tranſplant when two inches high in a warm border at a ſouth wall; its ſeed, with that of Baſil, comes from hotter countries. Sow Roſemary ſeed in April, or at the ſame time: take its ſlips or cuttings, and twiſt them a little at the ends, and dibble in good ſoil, on a ſouth-wall border; but cut not their tops: they eaſily root being watered in drought with ſoap-water; you may ply it to the wall as ſhrubs.

IV. I am now come to roots: They require a light earth, deep trenched, fat ſand mixt with ſheeps dung: 'tis convenient that it be dunged a year before, becauſe new dung makes them fork.

Plant Liquoriſh off-ſets and runners in February in this ſoil, well ſtirred and mixt; after which do not tread, except in the furrows, ſix rows in the bed, and cover all the intervals with litter topt with ſand, but let the plants be free; for this ſerves to keep out drought the firſt ſummer; keep them always clean of weeds, and cut their ſtalks near winter: Let it ſtand three ſummers in the ground, and in November take it up thus; begin at one ſide of the plot, and make a trench the whole depth of their roots, taking it out carefully without breaking it, at the face of the ſame, caſting the earth ſtill behind as you proceed; then cut

off the plants, to divide carefully, and lay them amongſt moiſt ſand in a cellar till ſetting time: and becauſe it ſtands three ſeaſons, you may have three ſeveral plantations; ſo ſhall you have it to take up yearly, if you plant it accordingly.

Raiſe Scorzonera by ſeeds and by off-ſets, *that is*, by parting the tops of the root; ſow it in the ſpring, or when its ſeed ripens, promiſcuouſly in the beds: It continues many years in the ground, and grows ſtill the greater, and is in ſeaſon at all times for eating, tho' it run yearly to ſeed.

Order Carvy as Scorzonera: its roots are eaten as Parſnips.

Raiſe Skirrets by ſeeds: when their ſtalks begin to wither, fall a ſpending them; and as you break off their roots for uſe, lay their tops or ſets in ground covered a little till the ſpring for planting. I cautioned you before to change the crops; theſe you ſpend not before the froſts come, houſe hard among very dry ſand, that you may have them when you will, rather as be barred from them by the froſts: theſe roots which come from the tops or ſetts are always ſo ſticky, there is no eating them; they love a moiſt rich ſoil.

Sow Parſnips by ſeed, only in March, promiſcuouſly over the bed, but thin; houſe them with Skirrets; and cut quite off their tops, leſt they grow amongſt the ſand; reſerve ſome of the beſt untaken up for ſeed, which will ripen the next ſeaſon; chuſe the middle ſtem ſeed.

Beet-rave may be ordered in all caſes, as Parſnips, except that you may begin ſooner to eat them, viz. aſſoon as they are big enough, tho' they laſt as long, beſides theſe you pickle: if in ſummer they offer to run to ſtem and ſeed, cut down their ſtems to the ground,

which

which will make their roots ſwell, they delight in a rich clay.

Sow Carrots as Beet-rave.

Turnips by ſeed in April, May, June and July, promiſcuouſly over the bed, very thin, and ſcarcely any covering of earth: the earlieſt prove not beſt. When they riſe, thin them; late turnips may be houſed, as Parſnips, and ſeeds reap'd accordingly.

Horſe-raddiſh grows by off-ſets, and laſts long too.

The Garden-raddiſh by ſeed only: for early ones you may raiſe them in the hot-bed caſes; hence you may have every twenty days, with other ſallading through ſummer, becauſe it quickly ſhoots for ſeed. Sow Black-raddiſh in Auguſt and September for winter; theſe ſeed next ſeaſon.

Potatoes being cut in as many pieces as you pleaſe, provided there be an eye at each piece, muſt be planted in March, five rows in the bed; plant not deep, neither in wet or ſtiff ground; ſpend them with Parſnips, and in houſing ſpread them only through a broad floor.

See part firſt, chap. V. for the orderly planting of kitchen-herbs.

V. Weeding, I think, may be accounted the moſt material part of Gardinery. The learned Evelyn takes notice of it; his directions are, "Weed and how betimes; continue weeding before they run to ſeed, "which is of extraordinary importance both for ſaving of charge, improvement of fruit, and the neat "maintaining of the gardens; wherefore, ſays he, "keep your weeds down, that they grow not to "ſeed, and begin your work of howing aſſoon as "they begin almoſt to peep; by this means you "will diſpatch more in a few hours than afterwards "in a whole day; whereas, if you neglect it till "they are ready to ſeed, you do but ſtir and re-

" pair the earth for a more numerous crop, and your " ground ſhall never be cleared."

And this agrees with what I had written my ſelf, *viz.* deſtroy weeds while young; for when they have grown ſtrong, and got deep rooting, they'll not only take the nouriſhment from the good plant, but there will be ſuch difficulty in grubbing them out, that the good ſeed or plant is in danger of being deſtroyed; but if you ſuffer them to bear and ſow their ſeeds, then, beſides that they exhauſt much more of the ſubſtance of the ground, you ſhall find the work intolerable, for they'll poiſon the whole ground, inſomuch that one year's ſeeds will coſt many years weeding; and therefore prevent theſe things by keeping down the weeds, ſo ſhall your work become eaſy, and the gardens handſome.

In beds where hows cannot go, you muſt weed with your hands on both ſides, ſitting in a furrow on a ſtraw cuſhion; pull up the roots cleanly, taking the help of the weeding-iron where needful; but make uſe of the how in all the intervals, drill-beds, nurſeries, furrows, tables or paths, whereby one will cleanſe more than ſome ſix by weeding with their hands; and if dry weather, they'll wither while they ly cut, otherwiſe take them in heaps, and ſpread again when rotted, or carry them to ſome open trench or pit; and ſtill be viſiting your plantations, that as ſoon as you perceive a weed peep, you may check it.

CHAP.

CHAP. VII.

Of ſome Physic-herbs, Shrubs and Flowers.

SECT. I.

MOST of the herbs in the laſt chapter are phyſicall; therefore having ſpoken to them already, I have the leſs to do here:

However there are ſome more, as Garden-rue; I uſe to environ ſage-beds with Rue, the ſoil not moiſt, mixt with aſhes, not cinders; you may box borders with it, as well as Lavender or Hyſop; which laſt is alſo increaſed by ſeed; and ſo is Golden-rod, Feverfew, Vervain, Celandine: they laſt many years, and ſo doth Wormwoods, Comfry, Solomon's-ſeal, Catmint, Calamint, Elacampine, Maſterwort, Wall-pellitory, Garden-germander, Betony, Camomile, Swallow-wort, Southern-wood, Lovage, Dwarf-elder, Harts-tongue, Maiden-hair, Aſarum or Aſſarabacca, Drop-wort, Birth-wort, Horehound, Spignel, Agrimony, Briony, Bears-breach, Sea-holly, Madder, Rhubarb, Dog-mercury, all which are eaſily increaſed by offſets in the ſpring; and require to be cut a little above ground at the beginning of Autumn.

Angelica, Spurge, Scurvy-graſs, *&c.* are Annuals, but yield ſeed the ſecond year from ſowing: you may ſow when ripe, or in the ſpring; but, if you prevent their ſeeding by cutting, they will laſt longer.

Bleſſed-thiſtle, Thorn-apple, Tobacco, Stinking-arach, Oak of Jeruſalem, *&c.* yielding ſeed, and dying the firſt year; therefore ſow yearly in April. The Virginia Tobacco requires the hot-bed, the reſt a good fat light ſoil, as doth Angelica. You muſt not bury Stinking-arach deep; ſow it as Purſlain.

There are many more, beſides multitudes in the fields, woods, glens, meadows, &c. of good uſe, many whereof you may bring into the garden, as I have done; but on theſe I ſhall not inſiſt, as I have given ſufficient directions for the kitchen-garden in part I. chap. V. for the different ways of propagation, in part II. chap. I. and how to order the ground in chap. II. I do not approve of planting the clod with theſe brought out of the fields, for it rots and turns ſour, and ſo kills the plant, altho' you may keep the clod about it till you come home, but then part it off carefully; prune their fibres a little, make the holes with the trowal, and plant in a co-natural earth to that of their wonted abode, well ſtirred and aired, which is an excellent mean to make all plants proſper, and therefore diligently to be obſerved.

II. Of Shrubs that loſe their leaves in winter; the choiſeſt whereof are,

Roſes of many ſorts; they are increaſed by ſuckers and layers. The muſk may be budded on the Eglantine, and ſet at a wall. The Double-yellow bears faireſt flowers; you may bud the Single-yellow on a Frankfort, and rebud the Double-yellow thereon, as I have often done on the Single, planted as a ſtandard, ſhaded in ſummer, and kept clean of ſuckers and ſuperfluous buds; and any that blow not freely, may be ſlit at the five diviſions of the hoſe.

Prune your Roſes after the flower is paſt, *viz.* before the full moon in October; cut behind a leaf-bud, and cleanſe them of dead wood; and if you deſire fair flowers, ſuffer but one ſtem on a root, and keep it low, and every fifth year cut them down to the ground, renewing their earth with old cow-dung.

Jaſmines, Honey-ſuckles, Pipe-trees, &c. are propagated by ſuckers, layers, and cuttings; ſee chap. I.

Mezerion by ſeed, as Hawthorn; they lye as long.

Of

Of Shrubs that are ever-green, there is Box, Savine, Arbor-vitæ, Tamariſk, Privet, &c. by ſuckers, layers and cuttings, in April: a ſhade, and fat ſoil are neceſſary for them, till rooted.

The Cherry-bay is an excellent green, and not very apt to blaſt, there is alſo Lauruſtinus, Philyrea, Alaternus, Juniper; for I love not Pyracantha, nor care I for Ever-green Oak and Cyprus. They are all raiſed by ſeeds, which muſt be couched in ſand before winter, and ſown in April to riſe that ſeaſon, except the Juniper, which lies till the next: tranſplant them the ſecond year after they riſe in April; remove by a trowal, with earth at their roots, toping ſuch roots as appear, without the clod, and leſſen the head by thinning it. obſerve the directions about Holly, for the ſame rules may be obſerved for theſe to be ſpread on walls; but ſave the tops of ſtandards: they all do well by ſuckers and layers alſo, except Cyprus and Juniper. Be careful to defend your ſeedling greens, while young, from ſpring blaſtings; yet do not choak them for want of good air.

The Pine, Cypreſs and Ever-green-oak, the laſt eſpecially, will ſcarce endure a removal from the ſeminary; therefore ſow them in drills, two foot interval one way, and half a foot the other; and the next year after they riſe, make a ſpade-bit trench between the rows, and work it cautiouſly, till you diſcover the running down root at one ſide; which you muſt top, with the pruning-knife, and level in the earth as it was: cut off ſome ſide-boughs, and thin the head; let them remain two years, then remove and plant them, as is inſtructed.

Greens that are beſt worthy our eſteem, are Scots-fir for ſtandards, Holly for hedges, the Cherry-bay for north aſpect walls, or barren creeping Ivy, which will neither blaſt nor ſeek ſupporting.

There

There is Strawberry-tree, and Tree-nightſhade, which are tender:

But Indian and Spaniſh-jeſamines, Myrtles, Oleanders, and Orange-trees are yet tenderer; wherefore, I am not very curious of them; yet there are ſeverals in this country who have them, and are at great pains in governing them, by ſetting them in caſes, with ſmall ſtones at the bottom, filled with earth, as thoſe mentioned for fine plants, chap. II. § VI. and at the ſeaſon, chap. I. § IV. Houſing them in winter, between the latter end of September and beginning of May, giving them freſh earth as they retire, and expoſe them, *i. e.* take out the upper exhauſted earth, ſtirring that below with a fork, not wounding the roots; and put in its place ſome rich and well conſum'd ſoil, watering on all occaſions with water wherein nolts dung is ſteeped, not touching the leaves or ſtem therewith, whereof be ſparing while they remain in the houſe, except after long froſts, in whoſe extremity is uſed a little fire, free of ſmoak, ſunk a little in the floor; and in warm days, free of froſts and fogs, acquaint them with the air, but ſhut them cloſs up at night again; and, when you may venture, expoſe them to the free air; yet even then ſet them a week in the ſhade, having firſt bruſhed them from duſt, *&c.* For my part, I had rather be in the woods, parks, orchards, kitchen-garden, or fields, meaſuring, planting and improving the ground to the beſt advantage: however I will here take a little turn among the flowers.

Thirdly, Of fibrous rooted flowers.

Gelly-flowers are the beſt, and are increaſed by offſets, layers, ſlips, and ſeeds. A light loamy earth well mixt with rotted ſoil of cows and ſheeps dung a year before-hand is moſt proper for them.

Altho' I have raiſed many double, by ſeed of my own reaping; yet the ſureſt way to preſerve the beſt,

is

is by laying, becauſe ſeedlings are apt to dye after they have born a flower. How to lay, ſee chap. I. §VI. Plant out your layers in ſpring, and give theſe in pots freſh earth, as the Orange-tree, and yearly cleanſe the old roots of withered, dead and rotten leaves, and leave not above one or two ſpindles for flower, if choice; and nip off ſuperfluous buds, leſt they blow and bear themſelves to death; and if any burſt, ſlit them as I directed with the Double-yellow-roſe. At midſummer, ſhade from afternoon's ſun a little; theſe that blow ſupport them againſt winds; ſet hoofs amongſt them for catching earwigs, their enemies; water well in drought, ſparing their leaves; preſerve the choiceſt from too much rains, by laying the pots on their ſides; ſtrike off the ſnow when it lies too weighty on them; theſe you incline not to bear ſeed, cut their ſtalks as ſoon as paſt the flower.

Raiſe Stock-gelly-flowers by ſeeds or cuttings; the ſeed of the ſingle will produce double, but the more flowers and leaves the mother hath, the doubler ſhall the product be: ſow and plant them with Carnations or Gelly-flowers; they affect the ſame ſoil with them.

Primroſes, Cowſlips and Bears-ears, by off-ſets in the ſpring, or when the flower is paſt, *viz.* in July, they affect a good natural earth, well mixt with rotten nolts-dung: the finer ſorts love a little ſhade in ſummer; if in pots or caſes, you may tranſport them to ſuch at pleaſure.

Great varieties may be raiſed from ſeed ſown in pots, the ſoil as aforeſaid, mixt with willow earth in Auguſt; take heed of deep interring Bears-ears, ſow them as Purſlain; ſet the pots and caſes with them at the ſouth ſide of a wall from November till March, at which time they ſpring, and muſt be now retired a little; tranſplant in July to flower next ſpring, and

neglect

neglect not to earth up ſuch as are apt to work out of ground, namely Bears-ears.

There are many others, as,

Noble Liverwort, Spring Gentianella, Virgin's Bours, *&c.* and are increaſed by off-ſets in the Spring, or by ſeeds at the ſame time; as alſo Columbins, Hollyoaks, Cran's-bill, Campions and Conſtantinople-flowers, Catch-flies, Pinks and Sweet-williams, Throat-worts and Bell-flowers, *&c.* or Daiſies, Violets, Spider-wort, Double-marſh Marygold, may be raiſed by off-ſets, any time when ſpringing.

Of bulbous and tuberous-roots, there are,

Tulips of great varieties; increaſe them by off-ſets when their ſtalks wither, which is generally about June, July or Auguſt; this is alſo the ſeaſon for other bulbous and tuberous roots; keep them in a cool, but dry place, till September or October, and then plant them in a light ſandy earth, with fat ſoil, two or three inches below the bulb, ſo that the fibres of the bulbs may reach it: remove every year. They may be raiſed from ſeed, but 'tis tedious.

Anemonies, the very ſame way as tulips, except that they require a rich earth, mix'd with rotten dung, ſo that it be not rank.

Apply this alſo to Ranunculuſes of the fineſt ſorts.

Cyclamine roots may be carefully parted in July, and ſet in the ſoil fit for Tulips.

Crocuſes and Colchicums, as Tulips; but they require a mix'd, rich, light ſoil: and ſo with

Iriſh Bulboſes, which love a dry, rich bed; and ſo with Narciſſuſes, Ornithogalums, Hyacinths, Aconites, Hellibores, *&c.*

Likeways Iriſh-tuberoſes, Crown-imperial, and Lillies of ſeveral ſorts, Peonies, *&c.*

Indian-tuberoſe is tender. See Eſq; Evelyn's kalendar.

There

There are many annuals may be ſown in pots, and plunged in hot-beds, and ſome under glaſs covers; eſpecially theſe ſown in Autumn.

Amarynthus, Marvel of Peru, Flos Africanus, Convolvulus, *&c.* In April you may ſow them on the cold bed, if good, fat, warm earth; together with Double-marygold, Cyanus, Nigella, Delphinium or Lark's-heel, Antirrhinum, Double Garden and Corn-poppies, Fox-gloves, Flos-ſolis, Flos-adonis, *&c.*

But if you would be further ſatisfied in the varieties of flowers, conſult Mr. Justice's Scots Garadiner, publiſh'd *anno* 1754 at Edinburgh.

IV. I ſpoke before of preſerving plants by houſing. There are ſome that cannot endure the houſe, which muſt be ſet at the South-wall, the pots ſunk two inches below the ſurface covered with glaſs, in prepared boxed beds, with folding glaſs-frames to lift up and down at pleaſure; becauſe in all ſeaſonable, warm blinks of the ſun and ſhowers, they may be diſcovered of all that covers them; thus treat choice Ranunculus, Anemonies, Amaranthus, *&c.* Neglect not to repair their earth, as in § II.

Plants ſtanding dry in winter, earthed up, or the earth made firm about them, are a good mean of preſervation; neglect not to cleanſe all your plants of under and wither'd leaves, ſuperfluous off-ſets, *&c.* ſee chap. I. § X. and ſee part I. chap. VI. § VII. for the orderly planting of flowers. And I hope the reader will excuſe this brevity, ſeeing each chapter here would merit a book; neither will leiſure permit me at preſent to enlarge.

THE

THE SCOTS GARDINER.

PART. III.

Of gathering, uſing and preſerving of FRUITS.

SECT I.

THIS neceſſarily depends upon the fifth and ſixth chapters of part II. of fruits and herbs eatable.

Gather Apples and Pears when full ripe, eſpecially theſe for keeping, or for cydar, in a dry day, clear, but not froſty, in large baſkets, lin'd with ſtraw matts, upon three footed or ſtanding ladders; at leaſt lay ſtraw under, if you ſhake them, and ſuffer not too many at once to ly in heaps.

Gather Apricocks, Peaches, Plums, Cherries, with your hands into clean baſkets, when full ripe, whether for eating green, preſerving in ſugar, *&c.* drying, or for vines; as alſo Currans, Barberries, Raſpberries, Goolberries. The Cucumbers for pickling muſt be ſmall, *i. e.* before their ſeeds grow large; and Gooſberries for baking, boiling and ſauſes.

Pull Artichocks before they grow too hard; let theſe for pickling be the tendereſt. Let the Purſlain for pickling be hard and old, lay it a day or two in the ſun to mortify; that which you eat green, muſt be tender. Eat Beans and Peaſe green, but do not ſlice down the Beans, nor break down the Peaſe ſtalks, elſe

theſe

theſe left thereon cannot fill. You may cut off the Beans with a knife; and for the Peaſe, hold with the one hand, and pull with the other.

Gather Aſparagus when tender, *i. e.* about three, four or five inches high: Lettice when young; but it is beſt cabbaged: Succory, Endive, Sellery, blanched: Creſſes, Parſly, Chervil, Burnet, when young and tender: Sorrel, Spinage, Beets, before they ſhoot for ſeed; and ſo is Orach, Mary-gold, Bugloſs, Burrage, Shallot and Onions when their ſtalks wither, tho' Shibols are eaten green. Leeks any time before they ſhoot to ſeed: Colly-flowers when firm and white, before they fly and divide their curds or turn yellow, and ſo Cabbage when hard. Sweet herbs any time, either green or dried; but gather them in their prime, when they are in flower, for drying.

Liquoriſh is no diſh but drink, ſee part II. chap. VI. § IV. where you will alſo find the ſeaſon of Scorzonera, Beetrave, Carrot, Turnip, Skirret, Parſnip, Potatoes, *&c.*

II. Beſides what is ſaid above of planting and ſowing at ſpring, ſummer, and harveſt; (for ſome have a longer continuance) as alſo of raiſing ſome earlier than by the natural way, by means of hot-beds, of retarding others by tranſplantations, *&c.* There are ways of preſerving them out of the garden.

Apples and Pears may be carried into the conſervatory or ſtore-houſe, in large baſkets between two men, which muſt be a cloſs, but cleanly and wholeſome room, floored, lined and ceiled with boards, and ſhelves of the ſame all round; let them ſweat a little on the floor, with clean oat-ſtraw under them; then dry and lay them Apple thick on the ſhelves, opening the north windows in fair, clear windy days, eſpecially at firſt, that the air may dry up the ſuperfluous moiſture; turn them ſometimes, and in froſts cover them with matts, and

ſhut cloſs the houſe; ſome of the choiceſt you may wrap in dry papers ſingly, and often viſit, that you may remove any that begin to rot, for they quickly infect the reſt.

The way of preſerving Cherries, Plums, &c. in Wine, Cyder, Honey, or Sugar is eaſy; as alſo of drying them in the oven.

And you may pickle Barberries in vinegar, and ſalt well dried, and ſugar; to each pound and an half of fruit, a pound of ſalt cold, and one quarter of a pound of ſugar, beat to powder; put them by layers in a well glazed earthen-pot, and when they have ſtood a whole week well-ſtopt, pour in a mutchkin of vinegar to each pound of fruit: if you find the ſauces too ſharp, put as much ſugar as ſalt.

Range Cucumbers the ſame way, and ſtrow ſalt and vinegar till they be all covered, and you may add a little Dill and Sweet-bay leaves for odour, and cover them cloſs forty days unbroken; then pare when you ſerve them up.

For Artichokes, diſſolve two large handfuls of great ſalt, that is dried on the fire in a pan, in one mutchkin of vinegar, and three of ſpring water; mix them while the ſalt is yet hot, but put not the liquor on the fire; boil the Artichokes till the leaves come off eaſily, and while the cleanſed ſtools are yet warm, you may have three nut-megs, three drop of cloves, one dram and an half of mace, a quarter of an ounce of white pepper, half an ounce of cinnamon beat to fine powder, and ſtrew upon them; then pack them in the pot, with five or ſix ſpoonfuls of the liquor on each ſtratum; when all are potted, pour on the reſt of the pickle, and ſtop them cloſs.

To pickle them green, put to every pound of cleanſed ſtools an ounce of ſalt dried, and a quarter of an ounce of ſpices laſt named, mixt in a mortar; and having

having dawbed the ſtools full of holes, throw the powder thereon when the pot is full; melt as much butter as cover them two inches over, and when cold, cover cloſs with leather.

To pickle Beetraves, boil and put them in glazed pots, with as much vinegar as cover them all over, ſtopping them cloſs.

Aſparagus may be parboil'd and pickled as Artichokes, and ſo may green Peaſe with cods; only the Sugar-pea which has no ſilm.

Purſlain as Cucumbers; and ſo may Taragon, Sampier, Broom-buds, &c.

Lettice, Endive, Sellery, &c. by blanching and ranging among ſand in Cellars. Cabbage by hanging. Roots by houſing, ſanding, &c. as is ſhewed in chap. VI. § II. and IV. Sweet herbs as well as phyſical, by hanging to dry in ſome open room, not in the ſun, as ſome adviſe.

Put Marygold-flowers in Paper-bags near the chimney, till they paſs hazard of mouldineſs; do juſt ſo with true Saffron: but becauſe few know how to order it, obſerve to part its off-ſets, and plant with other bulbs at half a foot diſtance in the beds or borders in July; it flowers in September; then be careful to go through in the mornings, and gather the Saffron, viz. the thrums that are in the middle of the flowers: it bears not well till the third, fourth and fifth year, then you muſt remove it. But to the matter in hand.

III. As for the uſe of theſe fruits, the phyſicians know their medicinals, the cook their ordering in the kitchen, and the gardiner how to propagate and improve them. For deſcription, and medicinal uſes, ſee our countryman doctor Moriſon's herbal; and for mechanical uſes, Evelyn's works.

To have diſhes and drinks of them, obſerve what follows.

IV. Of Diſhes; *viz.* Apples, you may have baked without any ingredients except ſugar, roaſted alone, alſo boiled, or fryed by ſhivers, with a little freſh butter, ſtewed betwixt two plates; having cleaved and taken out their cores, add a little ſweet butter and ſugar.

Pears, you may have roaſted and boiled as Apples; alſo ſtoved, being cut in four, and put dry in a ſtoup or oven of white iron, and ſo ſet in the pot among water to boil; you may have both Apples and Pears green with cheeſe.

Cherries and Gooſberries are excellent when baked; Apricocks, Peaches, Plums, Cherries, Currans, Gooſberries, Raſpberries, are all excellent diſhes green or conſerved. Strawberries with red wine or ſweet cream.

Cucumbers pickled for ſallad to roaſted Mutton; or, if ripe, ſlice and lay them an hour in ſalt, and ſo pour off their water. Artichokes are either pickled or freſh, boiled and eaten with ſweet beaten butter.

Beans and Peaſe boil'd with Savory and Thyme-fagot, ſerved up with ſweet butter beat among them, and ſet a little on a coal or chaffing-diſh; but they are more delicious without Thyme, *&c.*

Boil Aſparagus in fair water, and ſerve it up with a little ſweet butter beat, *i. e.* tumbled in the ſauce-pan above the coal. The young ſhoots of Coleworts will ſerve the ſame way, and we have good Brocoli alſo at this ſeaſon.

Purſlain may be eaten green with ſugar, and vinegar or oil, ſtew'd with meat, beſides pickl'd.

Lettice, green as Purſlain; and ſo Creſſes, Chervil, Burnet, Burrage-flowers, and Wood-ſorrel.

Spinage is excellent ſtoves, being boiled with lamb or veal, with a little Sorrel therein, as alſo chopped diſhes thereof with butter.

The ſame way uſe Beets; alſo make green broth of them with Leeks, fagot of Thyme, and Parſley.

In

In ſome ſtoves and broths you may put Orach, Marygold-leaves, Violet-leaves, Strawberry-leaves, Bugloſs, Burrage and Endive. In pottage put juice of Sorrel, fagot of Thyme and Parſley; and in moſt of broths.

In the ſauce or gravy of roaſt-mutton and capon, and in all ſtewed diſhes, bruiſe Shallot, or rub the diſhes therewith.

You may ſtove Leeks with a cock. Onions may be baked with a little butter if you want meat; alſo make uſe of them with roaſt-meat, eſpecially geeſe, and to moſt freſh fiſhes in which Parſley and Thyme-fagot is mainly uſed.

Boil Colly-flowers in water mix'd with a little milk; then pour it off, and mix them in the ſtew-pan with ſweet-butter ſeaſoned with ſalt, and ſo ſerve them up about boiled mutton.

Boil Cabbage with beef, reſerving the top of the pot to pour on, when diſhed up, about the beef.

Boil Scorzonera, peel off its brown rind, wherein conſiſts its bitterneſs; ſlice and fry it with butter.

When Skirrets are boil'd and peel'd, roll them in flour, and fry them with butter.

Boil and peel Parſnips, chop and bruiſe them well, pour on butter, and ſet them on a coal, and, if you pleaſe, ſtrew a little Cinnamon upon them.

Carrots are ſo uſed, or only diſhed by ſlices.

Beetraves are good when boil'd, peel'd, ſliced, and when cold ſerv'd up with vinegar and ſugar; beſides thoſe pickl'd.

Beetraves, Parſnips, Carrots, are very good ſerved up whole, or ſliced about meat, alſo Turnips, with fat broth poured thereon.

Potatoes as Parſnips; or, for want of butter, take ſweet milk.

V. Of Drinks, as of Apples to make Cyder; I cannot name our Cyder-apples, for I uſe to mix all the ripe at once in the orchard, that are of a fine juice, and

eaſy to ſeparate from the fleſh, and pears that have plenty of juice, and hard fleſh, though harſh.

In France they extol the Rennet-cyder, in England the Hereford-redſtrake, which in France they ſet at nought; they ſpeak of Genetmoil and Muſts, ſome Pippins and Pearmains; and for Perry, the Broomſbury and ruddy Horſe-pear: But now the different ſoils beget alterations in fruits, beſides the climate; yet both defects may be a little helped, the firſt by uſing all diligence to prepare the ground thoroughly, as is directed in chap. II. Fallowing is a moſt commendable eſſay. The ſecond by graffing and regraffing early. Good fences and ſhelter round the Ground are very conducible.

To make this excellent Wine, provide trough and beaters, preſs and harbag, lagallon and tapering-fat, barrels and hogſheads; for even by the common ſcrew preſs I have made a hogſhead of Cyder in a day. Be ſure your veſſels be ſweet, elſe you ſpoil all: White-wine, Sack-caſk, or ſuch as kept Cyder before. I have heard of Cyder-caſks three inches thick in the ſtaves, which I believe is of great advantage in preſerving the liquor; but if any be tainted, put a little unſlacked lime-ſtone, and a little water in the barrel, and ſtop it cloſs; when it has ſtood a little while and jumbled, pour out and waſh clean, and that will cure it.

The fruit being gathered ripe, as before, let them lye ten or twelve days, if ſummer-fruit; and near the double of that time, if winter-ſorts; but late ripe fruit that get froſts is not good Cyder: mix not with unripe ones, neither ſuffer leaves nor ſtalks among them. When they are ſmall beat, put them in the harbag within the preſs-fat, and ſo ſcrew them hard again and again; then empty it thereof, put in more, and do as before: empty the receiver into the tapering-fat, and then cover it cloſs with a canvaſs till next day at that time, before you tun it, that the groſs

groſs lee may fall to the bottom; then draw it off at a tap three inches from the bottom, leaving the dreg behind, which may go among the preſſings for Water-Cyder. The clearer you tun it into the barrels, the leſs it ferments, and that is the beſt Cyder: for often Cyder ſpends its ſtrength to free itſelf of the groſſer parts; therefore, while your Cyder ferments, leave the vent-pin looſe, but keep cloſs the bung for preſerving the prodigal waſte of its ſpirit; and as ſoon as the working begins to allay, drive the vent-pin dead to; and this will be perhaps in a fortnight, if it begins to work immediately, ſometimes not till the ſpring: but keep faſt the pin till it begins to work; and what you mind to bottle of it, do it as ſoon as fully clear and fine, which is ordinarly at ſpring. Put a plumb great of fine white loaf-ſugar in each bottle; and above all, make your corks faſt and cloſs, then ſet your bottles in the cellar among ſand.

To make the Water-cyder, put a third as much water as you had cyder upon the new-preſſed marce, to ſtand covered in tubs four or five days; then preſs them, and boil the liquor, ſcumming it till the ſcum ceaſe to riſe faſt; then take it off, for too much boiling waſteth its ſpirits, and put it in tubs or coolers, and when cold tun it up; when done working, which will not be ſo violent as beſt Cyder, make the pin faſt, and in a ſhort time it is fit for drinking. A little Ginger, Cloves, Juniper-berries, or ſuch may be boiled in it, if they pleaſe your taſte.

The making of Perry differs not from that of Cyder.

To make Cherry-wine, to every pound of ripe fruit ſtamp'd, put a chopin of Spring-water, and a quarter of a pound of fine white-ſugar; boil the water and ſugar, ſcum it, and put in the juice of your Cherries; let it boil up again, take it off the fire, run it thro' a hair-ſieve, and when 'tis throughly cold, put it in a

ſtone-

ſtone-pot, and after ſix or ſeven days, draw it into bottles, putting a bit of loaf-ſugar in each; in a quarter of a year you may fall a-drinking it: it will keep a year: if you would have it ſtronger, then uſe no more water than ſugar.

After the ſame manner you may make wine of Raſps, Currans, Gooſberries. Or,

Take Currans very ripe, bruiſe and ſtrain them, and to every pint of the juice put a pound and a quarter of ſugar into a ſtone or earthen-pot, ſcum it often, and at a week's end draw it off, and take out the ſettlings, and put in the liquor again; do this till it be fine, then bottle it; and at a week's end, if it be not fine in the bottles, ſhift it into other bottles.

Gather your Gooſberries 'ere they be too ripe, and for every three pound of ſtamp'd fruit, uſe a chopin of water, and a pound of ſugar; ſteep them twenty four hours, then ſtrain them; put the liquor into a veſſel cloſs ſtopt a fortnight or three weeks; then draw it off if you find it fine, otherways ſuffer it longer; and if not yet fine, rack it.

'Tis uſual to make it thus unboil'd, becauſe it contracts a brown colour in boiling.

To every pint of Raſps add a pound of ſugar; let them ſtand two days in an earthen-pot, often ſtirring and bruiſing them: then put them in a woolen bag to hang up twenty four hours or more, till the liquor drop out into a ſtone-pot; ſuffer it there till fermented and ſcummed, and at a week's end, or ſooner if fine, bottle it, and at another week's end ſhift it into freſh bottles, that you may leave the ſettlings behind; thus ſhift them ſo long as you ſee any ſediment, which you may put in a bottle by itſelf.

Of ſome ſorts of Plumbs, as Damaſons &c. may be made wine.

That

That called Cherry-brandy, is a bottle half full of Geens, filled up with brandy, ſometimes jumbled a little, and in a month's time is fit for drinking: or if you put the like quantity of Gooſberries inſtead of Cherries, that will make the brandy very delicious.

The Cherries beſt for wine, are Blackheart, and Morella. I think the red Geen moſt excellent, ſee Part II. Chap. III. § II.

Of Gooſberries the Great-chryſtal, and of Currants the Great Dutch-red, alſo the red Raſp are the beſt.

To have ale of Liquoriſh, ſlice it very ſmall, and pour water on it when at boil; then cover it cloſs till next day; pour off this wort, and more hot water on to ſtand ſo long as to ſearch it throughly; add your worts together, and boil them with a little dry Wormwood, or *Carduus-benedictus*: but the greateſt difficulty is to barm it when cold, as wort of malt: yet the ſtronger you make it, the eaſier it will take; or if you have the convenieney of ſettlings of good wort of malt to boil with it, that will facilitate the work.

To have good Metheglin, take one part of clarified honey, and eight parts of pure water, and boil well together in a copper veſſel till the conſumption of one half; but while it boils, take off the ſcum, and when done boiling, and it begins to cool, turn it up, and it will work of itſelf; as ſoon as done working, ſtop it very cloſe. Some adviſe to bury it under ground three months, and that to make it loſe both ſmell and taſte of honey and wax, and taſte very like wine. I uſe to add dry Roſemary and ſweet Marjoram in boiling: Some barm it as ale, which I have practiſed effectually.

VI. To know what fruits and herbs to make choiſe of for our plantations.

The French fruit ſucceeds not well with us; in England are good apples; but Holland excells for ſtone-fruit,

fruit, eſpecially Peaches and Cherries, and Scotland for Pears.

The beſt Apple for the table, is the Golden-pippin; we have alſo Rennets, Ruſſets, *&c.* very good. And for the kitchen the Codling, Lidingtoun and Rubies, with hundreds for both.

But the beſt Pears for the table are Engliſh Bergamot, Swan-egg, Red-pear, Achans, Cuiſſe-madam, all of them excellent, *&c.* The Wardens are good keepers and kitchen-fruit, and multitudes more.

Of Cherries, the Kentiſh and Morella, *&c.*

Of Plumbs, Primordials, Muſſel, Imperial, *&c.*

The common and Orange Apricock, the Newington and Nutmeg-peaches: Peaches bear better with us than Apricocks.

The Portugal Quince, and thin ſhell'd Wallnut.

Of Gooſberries, great White, great Red, and great Yellow.

Of Currants, the great Red-dutch, the White-dutch, the great Black.

Of Raſps, both the White and Red.

The great Red-ſtrawberry, and the Virginian, which is more early.

Of Artichokes, the great Green and the red.

Great White Beans, and White Kidneys: of Peaſe, Charleton, Hotſpurs, Haſtings and the Sugar-pea. *&c.*

If you can get *Hordeum Nudum, i. e.* naked Barley, and ſow as I directed with Peaſe, it yields an incredible increaſe.

The Dutch Aſparagus and Cabbage-lettice. The Sorrel that uſually ſhoots, not for ſtoves, *&c.* The White Beet or Beetchard, and ſmooth Spinage. Curled Parſley and Creſſes, Shallot and Roccumbol, French Leeks, and Straſburgh Onions.

Candy Colly-flower, and our own great Scots White Cabbage.

Criſp

Criſp Tanſy, and curled Spearmint, ſweet Fennel, and common Roſemary, ſweet Marjoram, and red Sage.

The black Scorzonera and Orange Carrot: the ſmall round ſmooth Turnip; ſmooth Dutch Parſnip, and ſmall Radiſh, clear as Cryſtal: for more ſee Part III. Chap. VI. And theſe are the fruits, roots and herbs moſt ſuitable to our ſoil and climate.

THE METHOD OF Planting an Acre of GROUND, with TIMBER-TREES and UNDER-WOOD; WITH The Profits which will ariſe from that PLANTATION, in nine, ſeventeen, and twenty five years after planting.

IF we conſider the many advantages that Great Britain in general hath received from timber of its own growth; how by its powerful fleets it hath gained the dominion of the ſeas, and now enjoys the benefits of an univerſal commerce, without mentioning the advantages it affords to every parricular owner of it: 'Tis wonderful to me, that the propagating of timber, a commodity ſo valuable and ornamental, ſhould

ſhould be ſo little encouraged now-a-days among us, when our natural ſtore is ſo near being conſumed, that, to all appearance, in a few years time, we may be forced to ſeek it in foreign countries.

Now, if I may be allowed to judge in this caſe, I conceive that the preſent decay of our timber, may depend upon one or other of the following reaſons.

I. That the making new plantations will be an immediate expence to us: Or,

II. That we cannot expect to reap any profit to ourſelves from ſuch plantations as might be made in our times: Or elſe,

III. That many gentlemen, who are already maſters of woods, receive little profit from them for want of due care and management.

I ſhall paſs by the firſt and laſt of theſe objections, they being anſwered in the foregoing chapters; and anſwer the ſecond, *viz.* That we cannot expect to reap any profit to ourſelves from the plantations which might be made by us: But I hope the method which I ſhall herein propoſe, will give full ſatisfaction in that point.

For which end I would recommend, that every plantation which ſhall be made, either in this preſent age or hereafter, may conſiſt partly of Forreſt or Timber-trees, for I know no barren Trees, as they are commonly called here, and partly of Under-wood.

Now the Under-wood which I propoſe to be planted and intermixed among the Standards or Timber-trees may be cut in eight or nine years after planting, and ſo from time to time every eight years will produce a very conſiderable return, as will appear hereafter in a ſtated accompt.

2*do*. The plants for Under-wood, which will encompaſs on every ſide the young Timber-trees, will not only ſhelter them from blaſts of wind which might

might be hurtful to them, but will alſo, by keeping off the circumambient air, draw them into ſtraight and tall trees, untill they can ſhift for themſelves, and are ſtrong enough to bear the ſeverity of the weather.

But to proceed, let us make choice of ſuch ground to plant upon, as may not be thought proper for corn, or at leaſt ſuch as will yield only a poor crop of grain: I ſuppoſe ſuch land will be worth about five ſhillings Sterling *per* acre by the year; and by all means let it be, if poſſible, near ſome navigable river, for the greater eaſe and cheapneſs of carriage: now, as I have before hinted, that as the land is, ſo muſt we allot the proper plant for it; I only wiſh it may be deep enough to nouriſh the Oak and Ilex, which are tap-rooted plants, and therefore delight in deep ſoil.

Suppoſing then we are fortunate enough to meet with an acre of ground proper for Oaks; we muſt firſt encompaſs it with a good fence, and then either dig or plow the land at a proper ſeaſon, to ly fallow for ſome time, till the turf be mellowed and fit for our purpoſe.

An acre of ground contains 160 ſquare perches or roods, each rood being 16 foot and a half; this quantity of land muſt be fenced about with a ditch ſix foot wide, three rows of Quick-ſets planted upon the ſides of its bank, at a foot diſtance from each other, and a dry hedge on the top.

A labouring man, working for one ſhilling a-day, may prepare nine foot of the ditch in length in one day, and cut ſtakes and buſhes, and make about five rood of the dry hedge in a day; ſo that he may prepare the hedge, make the ditch, plant three rows of Quick-ſets, and pay the expence of them, after the rate of two ſhillings *per* hundred, for about three ſhillings the perch; ſo will the whole charge of making a fence about an acre of land, be ſeven pounds ſixteen ſhil-

lings; but we may fence in two acres of land after the ſame rate, being 32 perches long, and ten perches wide, for nine pounds ſix ſhillings; a pole or perch planted with three rows of Quick-ſets, will take up about 48 plants, ſo will there be required to plant about an acre, 2496 plants.

Thus having provided a good fence to defend our young plantations from dangers of cattle, and other inconveniencies, the next thing to be done, is to prepare the incloſed land for planting; which may be performed ſeveral ways.

Suppoſing the land to be encumbered in the worſt manner with Buſhes, Whins or Furze, *&c.* ſo that a plough cannot be uſed upon it, then may it be dug and cleanſed for about ſixpence the ſquare perch: The whole acre, if it be dug at that rate, will come to four pounds: But if the ground ſhould happen to be in that ſtate that a plough can work in it, an acre may be ploughed for about twelve ſhillings.

The land being thus prepared, one acre will contain forty plants of Oaks at 33 foot diſtance: and as I have hinted before, that all tap-rooted trees are endangered by removing, and that, when they are tranſplanted, they ſeldom come to the perfection of thoſe which are raiſed from ſeed, and remain always in the ſame place; I ſhall therefore recommend, that forty beds of good natural ſoil be prepared on the acre of land, at the aforeſaid diſtance of 33 foot from each other, and that in each bed, five or ſix Acorns be planted, about four inches deep, in February, which ſeaſon I chuſe rather than the Autumn, becauſe the over-wet ſeaſon of ſome Winters might rot the ſeeds, or Mice, Squirrels, and ſuch like animals, might deſtroy them.

Theſe forty beds may be well prepared by one man in three days, at one ſhilling a-day; two hundred A-

corns

corns may be worth about ſix-pence, and the planting of them be worth about ſix-pence more, which makes in all four ſhillings.

The acre of land being thus ſown with Oaks, we may interſow the remaining part of the ground with Aſh-kies, which have been kept all the winter in dry ſand; theſe will turn to very good account; as alſo plain Seeds, Nuts of ſeveral kinds, Haws and Sloes, conſidering that the land is already dug or plowed for our purpoſe.

One buſhel of Aſh-kies may be worth two ſhillings, the ſowing of them one ſhilling, and the harrowing the ground after ſowing will be worth five ſhillings more, in all eight ſhillings. When the Oaks and Aſhes are come up, they muſt be hoe'd and cleanſed from weeds; one man may do this work in three days, leaving the diſtance of three foot between the Aſhen plants: the expence of this weeding will be three ſhillings; for I reckon a man's work at one ſhilling a-day, becauſe I ſuppoſe ſuch plantations will only be made in thoſe places where land is cheap, and conſequently every thing elſe is valuable in proportion.

The ſecond year, we may draw ſome of the young Oaks, leaving a ſingle plant in each bed: now it is likely, that all the Acorns which were put into the ground may not come up; therefore I would adviſe, as the ſureſt way to have our expectations anſwered from the ſeeds we ſow, to try the goodneſs of them before they are ſown; which may be done by putting them in water, and planting only thoſe which ſink quickly to the bottom.

An acre of land thus fenced, dug, cleanſed and planted, comes to twelve pounds and eleven ſhillings, and two acres dreſſed and planted in like manner, will coſt eighteen pounds ſixteen ſhillings.

But if the land will be clean enough to admit the plough, then the charge of fencing, planting, &c. of one acre, will be nine pounds three ſhillings, and the expence of two acres dreſſed in the ſame manner, twelve pounds.

In nine years after this plantation has been made, the Aſh plants will be fit to cut for Poles or Hoops, worth upon the place ten ſhillings a-hundred: if the plants ſtand at a yard diſtance from each other, the acre of land will then contain about 4800 plants, which may be ſold for twenty four pounds Sterling. The Quick-ſet fence muſt likewiſe be cut down, and will yield about ten load of Buſhes; we will ſuppoſe them only worth five ſhillings a-load, altho' near London they ſell for four times as much.

The whole charge of fencing, digging and planting an acre of land, with Oaks for Timber, and Aſh for Under-wood, with the profit of the firſt nine years growth, may be ſeen in the following accompt.

Accompt of 9 years after planting, *or firſt* cutting.

	L.	*s.*	*d.*
Expence of fencing, digging and ſowing an acre of land for Timber and Under-wood.	12	11	0
Intereſt of the aforeſaid ſum for 9 years, at 5 *per cent.*	5	12	6
For cutting 4800 Aſhen poles, one man, five days, at one ſhilling a-day.	00	5	0
Rent of the land for 9 years, at five ſhillings *per* acre *per annum.*	2	5	0
Nine years expence	20	13	6

Received

Received for 4800 Aſhen poles, at ten ſhillings a-hundred.	24	00	0
Received more for ten load of Buſhes at five ſhillings a-load.	2	10	0
Nine years gain	26	10	0
Nine years expence	20	13	6
Neat profit of the plantation in 9 years	5	16	6

After this cutting, we may cut again in eight years time, and expect 4 or 5 poles on each Aſhen plant.

Accompt of 17 *years after* planting, *or ſecond* cutting.

RENT of the land for 8 years, at five ſhillings *per annum.*	2	00	0
Expences of cutting 19200 Aſhen poles, reckoning 4 to each plant, one man 20 days, at 1 *s.* a-day.	1	00	0
Seventeen years expence	3	00	0
Received for 19200 Aſhen poles, at ten ſhillings a-hundred.	96	00	0
Received more for ten load of Buſhes, at five ſhillings a-load.	2	10	0
Gain'd clear of expences by the firſt cutting.	5	16	6
The intereſt which might be gained on 5*l.* 16*s.* 6*d.* in eight years, at 5 *per cent.* is about	2	6	0
Seventeen years gain	106	12	6
Seventeen years expence	3	00	0
Neat profit of the plantation in 17 years time.	103	12	6

Accompt of 25 years after planting, *or third* cutting.

Rent for 8 years, at five shillings the acre *per annum.*	2	00	0
Expence of cutting 19200 Ashen poles, one man twenty days, at one shilling a-day.	1	00	0
Twenty five years expence	3	00	0
Received for 19200 Ashen poles, at ten shillings a-hundred.	96	00	0
Received for 10 load of Bushes, at five shillings a-load.	2	10	0
Gained clear of expences by the second cutting.	103	12	6
The interest which might be gained on the aforesaid sum in 8 years, at 5 *per cent.*	41	8	0
Twenty five years gain	243	10	6
Twenty five years expence	3	00	0
Neat profit of the plantation	240	10	6
To which may be added the value of the 40 Oaks then growing in the said plantation, worth 10 s. a-tree	20	00	0
In all	260	10	6

By the foregoing accompt, we find that an acre of land, planted as is directed, may produce 103 *l.* 12 *s* and 6 *d.* in the space of 17 years, clear of all expences of planting, and value of the land; and the Oaks, if they are still continued growing, will yet produce a more

more considerable return to the owner, or his family after him.

By the example of this plantation, others may be made with different kinds of trees; and if the planter has due regard to the soils proper to what he designs to plant, he may expect a return for his labour and industry, answerable to what I have mentioned in this accompt; and if his ground happens to be already fenced for his purpose, and is capable of admitting a plough upon it, he may yet reap a much more considerable profit from his plantation.

N. B. Men's wages are here calculated at a shilling a-day; but they may be had at eight pence a-day, which will make the profit greater.

THE

THE GARDINER'S KALENDAR.

NOVEMBER.

CONtrive or forecaſt where, and what you are to ſow and plant. Trench and fallow all your vacant grounds. Prepare and mix ſoils and compoſts thoroughly. Miſs not highway earth, or cleanſings of ſtreets to clay grounds. Make compoſitions of dungs, ſoils and lime.

Lay bare roots of trees that need it, and dung with old rotted manure, ſuch as require it. Plant all Fruit-trees, Forreſt-trees, and Shrubs that loſe the leaf; alſo prune ſuch. Sow Haſtings for early Peaſe in warm grounds; but truſt not to them.

Gather the ſeeds of Holly, Yew, Aſh, *&c.* ordering them as in Part II. Chap. III. Furniſh your nurſeries with ſtocks.

Shelter tender ever-green Seedlings. Houſe your Cabbage, Carrots, Turnips; and any time before hard froſts, houſe your Skirrets, Potatoes, Parſnips, *&c.* Cover Aſparagus, Artichokes, *&c.* Sow Bears-ears, plant Tulips, *&c.* Shut the conſervatory. Preſerve your choiceſt flowers. Sweep and cleanſe the walks of leaves; lay up great quantities of them to rot for flower-ground, *&c.* Stop your Bees cloſs, ſo that you leave breathing vents.

This month is ſubject to violent winds, froſty nights, and great rains, taking their courſe by turns, to the great hurt of our gardens and plantations: It is not enough

enough to guard againſt the pinching froſts, or ſhelter many tender plants from the cold rains which fall at this ſeaſon; but we muſt alſo be diligent to ſecure our Fruit-trees, and ſuch Forreſt-trees as have been lately planted, with ſtrong ſtakes, leſt they be blown down or ſhaken by the boiſterous winds now coming from the Weſt; for nothing, in my opinion, contributes to deſtroy the welfare of a young tree more, than to leave it unguarded and expoſed to the mercy of the winds: the young fibres lately formed are broken, and every part thro' which the ſap ſhould have its paſſage to the head, is bruiſed and wounded, ſo that for want of free paſſage for the ſap, the top is not half ſupplied, and the whole languiſhes.

Now make hot-beds for Aſparagus, that you may have ſome in December; and if you are not provided with roots in your own nurſery, you may take them from ſome plantation, which has never been cut, of four or five years old. Set the roots cloſs together, without trimming; taking care that they do not come within four inches of the dung, and that the buds are covered, at leaſt, four inches thick with earth.

'Tis now a very good time to lay down branches of the Vine, eſpecially ſuch as we would have fruit upon the following year, to be ſet growing in pots upon a table at great entertainments. The branches for this purpoſe muſt be ſhoots of the ſame year, and ſo drawn through the hole at the bottom of a garden-pot, that when it is filled with earth, there may be a reaſonable number of eyes or buds above ground: A ſtrong branch perhaps may leave eight or nine bunches of grapes; and as the bunch is ſmaller, four or five in proportion.

Garden

Garden diſhes and drinks in ſeaſon.

CAbbage, Colly-flower, Onions, Leeks, Shalot, &c. Blanched Sellery and Endive, pickled Aſparagus, Purſlain, &c. Freſh Parſnips, Skirrets, Potatoes, Carrots, Turnips, Beetrave, Scorzonera, Parſly and Fennel roots. —— Apples, Pears, &c.

Cyder, Perry, wine of Cherries, Raſps, Currants, Gooſberries, Liquoriſh, Honey, &c.

DECEMBER.

TRench and prepare grounds. Spread compoſts, to get the benefit of froſts. Plant trees in nurſeries, and ſow their ſeeds that can endure it.

Gather Fir-ſeed, Holly-berries, &c. Take up Liquoriſh. Continue your care in preſerving choice Carnations from rains and froſts; and keep the Greenhouſe cloſs againſt the piercing colds. Turn and refreſh your fruit in a clear and ſerene day. Sharpen and mend tools. Gather Oziers and Hazle-rods, and make baſkets in ſtormy weather. Cover your water-pipes with litter, leſt the froſts crack them. Feed weak bees.

This month, commonly called the black Month, is ſubject to every ſort of weather which is fatal to plants of a tender nature; all Vegetables of our climate ſeem now to ſleep. The days are ſhort, and very little warmth from the ſun makes every curious lover of gardens wiſh for Spring; tho' indeed, 'tis now an ingenious gardiner will ſhew his ſkill, in helping nature by art, to produce ſuch fruits and herbs, as ſhe is not capable of bringing forth without very extraordinary aſſiſtance.

Guard againſt the violence of froſts, which commonly begin with great ſeverity to reign in this month.

Prune

Prune orchard fruit-trees, and take away ſuch branches as make confuſion, covering every conſiderable wound with the following mixture.

Take of bees wax, roſin and tar, each a pound; of tallow half a pound; melt and mix them together; and immediately after amputation, dip a painting-bruſh in this mixture, and cover the wound with it.

In open weather we may continue to ſow Peaſe and Beans as formerly.

In froſty weather bring into the garden the neceſſary manures for enriching the ground.

Garden diſhes and drinks in ſeaſon.

COleworts, Leeks, *&c.* Houſed Cabbage, Onions, Shalot. Several dried ſweet herbs. Houſed Parnips, Turnips, Skirrets, Carrots, Potatoes, Beetrave, Scorzonera, Parſly, Creſſes and Chervil; Fennel-roots, pickled Cucumbers, Barberries, Artichokes, Aſparagus, Purſlain, Sellery and Endive blanched, *&c.*

Houſed Apples, Pears, Conſerved Cherries, Plums, Peaches, Apricocks, &c.

Wine of Apples, Pears, Cherries, Liquoriſh and Honey, &c.

JANUARY.

PRepare the ground, ſoils and manures. Fell trees for mechanical uſes. Prune Firs: plant Hawthorn-hedges, and all trees and ſhrubs that loſe the leaf, in open weather; alſo prune the more hardy and old planted. Dung the roots of trees that need it: drain exceſſive moiſture: gather graffs before they ſprout, and graff near the end of the month; begin with the ſtone-fruits. Gather Holly-berries, Fir-huſks, &c. Secure choice plants as yet from cold and wet, and earth up ſuch as the froſts have uncovered.

Feed

Feed weak bees; you may alſo remove them.

This month is commonly froſty, and if we have any great ſnow in the courſe of the whole year, it is about this time; and it is obſervable, that the moſt piercing cold reigns chiefly at this ſeaſon: therefore whatever is nice and curious in our gardens, muſt now be diligently looked after, eſpecially thoſe plants which are in hot-beds, by taking proper means to defend them from the cold air.

Some plant Strawberries upon a moderate hot-bed, to make them bear fruit betimes, but keep them not too tender; alſo plant Mint, that it may not be wanting for ſallads in this ſeaſon. Remember to make new beds frequently of Aſparagus as you have uſe for it.

In open weather continue to trench ground, laying it in ridges till you uſe it.

It is now alſo a proper time to compoſe earth, by mixing ſeveral ſoils together of different qualities.

Uncover the roots of trees that are too luxuriant, cutting off ſome of their large roots, as well to curb their too great vigour, as to prevent their too early bloſſoming.

If the weather be open, tranſplant all ſorts of Timber-trees, having firſt prepared the places for them.

In planting of trees, have due regard to the manner of the roots, that thoſe which naturally ſpread near the ſurface be not planted too deep; but, as near as you can, imitate nature in this and all other garden-work.

In planting trees for timber, always preſerve the leading or upright ſhoots of the trees, pruning off the ſuperfluous branches: chuſe rather to plant ſmall trees, than thoſe of a large ſize; a few years will reward your wiſdom in ſo doing; for where trees have ſtood long enough in one ſoil to become large and ſtately

ſtately, they are hardly to be reconciled to any other, whatever diligence may be uſed.

Set traps for Vermine, which are now very buſy about your young Peaſe, *&c.*

Plant Cabbages, Turnips, Parſnips and Carrots for ſeed.

Garden diſhes and drinks in ſeaſon.

COleworts, Leeks, &c. Dry ſweet herbs. Houſed Cabbage, Onions, Shalot, Parſnips, Skirrets, Potatoes, Carrots, Turnips, Beetrave, Scorzonera. For ſallad, tops of Mint, young Creſſes, Muſtard, Radiſh, young Lettice, Onions, Sellery and Endive; the tops of Burnet and Chervil, Parſly and Fennel-roots in broth.

Pickled Artichokes, Beetrave, &c. Houſed Apples, Pears, and other conſerved fruits.

Cyder and other wines, as before.

FEBRUARY.

PLant any trees or ſhrubs that loſe the leaf; alſo lay and circumpoſe ſuch for increaſe; ſee June. Likewiſe ſow all your ſeeds, kyes, kirnels, nuts, ſtones; alſo the ſeeds of ſeveral greens, as Holly, Yew, Phillyrea, Laurels, *&c.* prune Firs, *&c.*

Continue to deſtroy Vermine.

Graffing is now in ſeaſon; ſee the laſt month.

Prune all trees and ſhrubs, except tender greens; nail and dreſs them at the wall: cover the roots of trees laid bare the fore-end of Winter, if there be any. Plant Hawthorn-hedges, Willows, *&c.*

Plant Liquoriſh, Peaſe, Beans, Cabbage; ſow Parſly, Beets, Spinage, Marygold, and other hardy potherbs.

Let Carnations and ſuch ſhelter'd flowers get air in mild weather; but keep cloſs the green-houſe.

Now you may remove Bees, and feed weak ſtocks.

This month hath been commonly reckoned the wetteſt in the whole year: and it has been obſerved, we have rarely any laſting froſts which begin at this ſeaſon; but have taken notice, that when January has given us a good ſhare of froſt and ſnow, the weather in this month is commonly warm, pleaſant and delightful; and if that happens, it is an admirable time for planting trees, either for fruit-timber or ornament, if thoſe works were not compleated in the Autumn.

Elm-layers ſhould now be gathered from the roots of large trees, and planted in a nurſery, and young plantations provided of all ſorts of Foreſt-trees and Shrubs, which are propagated from Slips or Layers.

Set Acorns of the Oak, Cheſnuts and Walnuts, and Ilex, and ſow Bay-berries, all which come up the firſt year. But if the weather is bad, delay it till March.

Sow the Maſt of Aſh, Beech, and ſuch other timber-trees as have been prepared a year in ſand, or otherways they will be two years in the ground; as alſo the berries of the Hawthorn, Yew, Holly, &c.

What I here mentioned concerning the preparing of Seeds in Sand, is the common practice: But I am informed by a good author, that a certain man ſowed Holly and Yew-berries, which were two years old, and had not been prepared that way, which came up the firſt year without difficulty: and he adds, that he gathered Aſh-kyes in the ſpring, and ſowed them immediately, and they came up in like manner; but this is nothing extraordinary, ſeeing that the Aſh will frequently hold its kyes two years without letting them drop, and at that age they are prepared of themſelves to grow without any artifice.

Other

Others ſay, that Holly-berries being gathered and laid in a heap in the houſe, without ſtirring them till the ſpring, thoſe which lye in the middle of the heap, will not only be void of the pulp or fleſhy part, but begin to ſprout, and then being immediately ſown, will come up the ſame ſeaſon. This may happen perhaps from the ferment which the berries would raiſe when they began to ſweat.

Prune and nail your Wall-trees, eſpecially Apricocks, and all other Stone-fruit.

Sow Skirrets in light ground, where they may have ſome moiſture. It is held by ſome, that when the roots are about two inches long, they ſhould be tranſplanted, to make them large.

Plant Garlick, Shalots, and Rocambole for increaſe, in light ground.

Set Potatoes and Jeruſalem Artichokes in heavy ground.

Tranſplant young Cabbage Plants for a crop, if that work was not done in the preceeding month.

Sow Aſparagus Seeds in the natural ground.

Towards the end, begin to graft in the cleft, Cherries, Pears and Apples.

Now make your hot-beds for Melons and Cucumbers, and continue to ſow every ten days, for fear of danger from the weather.

Melons or Muſk-melons are multiplyed by a ſeed which is like that of a Cucumber, excepting in colour, which in Melons is of a pale red, and is not broad as that of others; of the culture of which we ſhall here preſent you with a moſt ample account, as it has been delivered by the honourable Mr. John Evelyn.

The moſt undegenerating ſort of Melons, are not large, but of a middling ſize, the rind thin, faintly embroidered, and without being ribbed or divided along the ſides, or at leaſt very obſcurely: Others there

are which are whitiſh, ſome of ſlate-colour, red-fleſh, dry, yet melting in the mouth, and not at all mealy; but of an high colour and generous guſt. In a word, they are the only ſort, after trials of many hundred kinds, I have cultivated with ſucceſs, and retained their good qualities more than twenty years without any conſiderable diminution.

Every gardiner, now a-days, knows how to raiſe Melons, but very few to govern them, the greateſt difficulty whereof is in the taking off ſuperfluities, to cauſe them to knit and bear as they ſhould do; in order to which, obſerve theſe few directions.

The firſt thing appearing, after the ſeed is ſown, and the plants pricked out from the firſt hot-bed into a larger hot-bed, are a pair of ſmall ſmooth leaves, which in France are called the ears. A few days after, betwixt theſe comes up a ſingle leaf, which we call the firſt leaf, as being on the firſt knot. Next to this in the ſame place, and ſoon after, there appears another which we term the ſecond knot: about the middle of whoſe ſtalk, there ſhoots out another leaf called the third-knot, which third knot is always to be pruned off, but with care, and without wounding the ſtalk or branch of the ſecond-knot, upon which that third did grow; it being from this place you find that branch to ſprout, which we call the Firſt-leader, and is that which will ſend out a firſt, ſecond and third knot; which third, and all other ſuch thirds, you muſt cut or pinch off, as you did the other, without ſtaying for a fourth, or fifth, or more ſhooting. It is from theſe knots and joints, that other branches in like manner will proceed, knit, and form into excellent fruit, provided the foot and original ſtem has been well nouriſhed, in rich, warm and proper mould, and well expoſed. And the beſt mould is one third old rotten neat's dung, one third rich black mould,

mould, and the other may be old rotten horſe dung, and one half of white rich river-ſand; this muſt lye one year at leaſt in compoſt, to mix, incorporate and ſweeten before you uſe it.

I muſt not forget, that from the middle, likeways betwixt the ear, and two firſt leaves, there frequently riſes another branch, which you may abate or leave on, as you find it likely to prove, eſpecially if a vigorous one; but the leaf iſſuing from the middle of the fourth joint, and ſeveral more beſides ſucceſſively ſpringing out of one another, as you ſee the fourth from the third, I purpoſely omit, and have only figured, as ſuperfluous to the ingenious gardiner.

When I tranſplant from this nurſery-bed, into the prepared holes or ridges, and open meloniere, I commonly place two roots together, unleſs I meet with an extraordinarg good plant, and then ſpare both the branches which ſpring from each ſide, betwixt the ear and haft; as before is ſhewn: But when I plant to root near each other, as I do when they are not very fair ones, I totally reject both branches, which ſhoot from the two oppoſite ears, to avoid that confuſion of thoſe ſupernumeraries which injure the principal ſtem and foot itſelf.

Never ſuffer the root, or ſtalks of your melon-plants to touch the dung; nor ſhould you water them immoderately; but when the earth is very dry, and the ſeaſon exceſſively hot, refreſh and give the roots drink, without deferring it till the ſhoots complain, when it may come too late; I water them in theſe periſhing ſeaſons, two or three times every week; in the evenings when the ſun is ſetting; and at ſeven in the morning; and then cover them with Matraſſes from eleven till two o' olock, during the ſun's exceſſive violence, which exhauſts and conſumes the humidity, neceſſary to both roots and branches.

I cover my Meloniere when it rains, leſt too much moiſture prejudice the fruit, all which requires a great deal of care, and no ſmall pains, tho' this regular proceeding is to me a real pleaſure. I alſo obſerve to put over my dung eighteen good inches of the foreſaid compoſt; for in this depth of ſoil, the Melons proſper much better than if they had but eight or ten inches depth, which is the very wrong practiſe of many gardiners.

When the foot of your Melon-plant grows over luxurious in branches, cut away the feebleſt of them, leaving not above three or four of the moſt vigorous, and of thoſe whoſe knots grow neareſt to one another: And when the Melons are knit, ſuffer not above two upon each foot, chooſing ſuch as are beſt placed, and neareſt to the main and principal ſtem, which ſhould be thick, ſnug, and not too far above the ground; if theſe are knit, and beginning to form, make choice of the handſomeſt, that are well truſſed, with a thick ſhort tail; Melons with long ſtarts, ſlender and narrow leaves, never prove worth any thing.

When you begin to cover with bells, raiſe them ſo upon little forks, as they neither reſt upon the fruit or branches, or quite exclude the air; but ſo as to keep the edges from bruiſing, and preſſing the tender ſtalk and intercepting the current ſap.

It now and then happens, that there riſes a ſecond branch from between the ears and two firſt leaves, though I mentioned indeed but one; but this is very ſeldom, and you are ſtill to count them but one joint or knot, though there will thence proceed a ſecond, third, fourth, and perhaps twenty or thirty more further remote, if you let them alone, and be not vigilant to reſtrain and ſtop this exuberance in due time. 'Tis true, they will preſent you with fruit at the extremities of their branches, but 'tis little worth, as being

being ſo far diſtant from the root, that the ſap ſpends itſelf in the tedious paſſage before it arrives, as you will find by the withered branches and dryneſs of the leaves, which ſhould ſcreen both branches and fruit till they are ripe, as we ſee they do, where a Melon has a ſhort and ſubſtantial foot. A curious gardiner therefore ſhould viſit his Meloniere from time to time, and be cutting off all mutilated, ſtarted and vicious branches which annoy the plants; for theſe impertinents will grow even to the view of one's eyes, and quite impoveriſh the fruit, if not timely prevented. However I prefer frames to bell-glaſſes in this climate for the propagation of Melons.

Thus you ſee I am careful to purge the ſtem of all the ſmall, ſtraggling, and unprofitable branches, from which there is no expectation of good fruit; whilſt, obſerving thoſe that have well-knit Melons on them at the ends of the branches, I conſtantly take away the reſt of that branch on this ſide the fruit, which deviating into other uſeleſs wanderings, would rob, and deprive the fruit of the nutriment derived from the root; nevertheleſs with this caution in pruning, I ſpare ſome leſs noxious branches to ſhade the fruit, that it be not left quite naked, and expoſed to ſuch a ſcorching heat as would hinder its growth and maturity, which within forty days from its nativity, and knitting into fruit, arrives to full perfection. Obſerve alſo if the vines of your Melons offer to run out from below your frames; ſet the frames up ſo as the vines of your Melons may run; but obſerving always to lay the compoſt preſcribed below the vines, as far as they run, eighteen inches deep; they will invigorate the vines, and the dews they then receive will make their fruit ſet apace.

Great and Pompion-like Melons are very ſeldom tolerably good, as arriving to their bulk, either from the

the nature of the Seed and Kind, or from ſuperfluous watering the ſmaller ones; wherefore, although, as I ſaid, they cannot ſupport the too exceſſive heats, the leſs water you give your Plants, provided you find them not to want it, the better; and that rather a little at a time than much: Once a week is for the moſt part ſufficient. As to this therefore you muſt determine and regulate your refreſhments with great circumſpection, and judge by the nouriſhments which you conceive neceſſary to produce and mantain the foot with its branch and leaf deriving from it, without which no kind and genuine fruit is to be expected.

When you would gather a ripe Melon, you will have notice by its turning a little yellow; from that time within a day, as the weather proves, it does ordinarly ripen, and begin to caſt a grateful ſcent; this yellowneſs appearing in ſome part of it or other, and not ſeldom with ſome rifts or little chaſms about the ſtalk, *&c.* are moſt infallible indications of its being left rather too long, than too haſtily gathered: The gardiner muſt therefore not fail of viſiting the Meloniere at leaſt three times a day, Morning, Noon, and Evening, for this critical time of ripening. He will ſometimes find Melons ripen too faſt, but they are ſeldom or never good, as proceeding rather from a ſickly, or vicious root, then from the nature of the Plant, or ſpecies of theſe I cultivate.

After twenty four hours keeping, or the next day after it has been gathered, (for ſo long, contrary to vulgar opinion, it ſhould be preſerved in ſome dry ſweet place, and not eaten immediately as it comes from the garden,) a perfect and tranſcendent Melon will be full juicy, and without any vacuity; which you will eaſily diſcern, by rapping a little with your knuckles upnn the out-ſide of the fruit; the meat ſhould alſo be

be dry, or but a little red, meazing out of the pulp, but by no means wateriſh and fleſhy: to this add a vermilion colour, a grateful flavour, and an high and racy teſt.

Laſtly, reſerve for Seed, that only which lyes towards the ſunny ſide of the Melon, which, being immediately cleanſed from its mucilage with a dry lining cloath, reſerve in boxes, or papers, in ſome temperate and ſweet place.

Garden diſhes and drinks in ſeaſon.

COle, Leeks, ſweet Herbs. Onions, Shalot, houſed Cabbage, Skirrets, Turnips, Parſnips, Potatoes, Beetrave, Scorzonera, Carrots; beſides Parſly and Fennel-roots.

Pickled Beetrave, Artichokes, Cucumbers, water Creſſes, and blanched Dandillions: Houſed Apples, Pears, and other conſerved Fruits, with Cyder and other Wines and Drinks as before.

MARCH.

RE-delve, mix and rake your ground for immediate uſe; delve about the roots of all your trees. Yet plant Trees, or rather Greens. Alſo prune ſuch, except the Roſinous. Propagate by laying, circumpoſition, and eſpecially by cuttings. Sow the Seeds of moſt Trees and hardy Greens. Cover theſe Trees whoſe roots lye bare, and delve down the dungs that lye about your young Trees all winter, covering on litter again, topt with earth, to prevent drought in ſummer: this is a material obſervation, and more eſpecially for ſuch as are late planted. Slit the bark of ill thriving Trees. Fell ſuch as grow crooked in the nurſery.

ſery. Graffing is yet in ſeaſon, but too late for ſtone-fruit; cut off the heads of theſe inoculated.

Set Peaſe, Beans, Cabbage, Aſparagus, Liquoriſh. Sow Parſly, Beets, Endive, Succory, Bugloſs, Burrage, Sellery, Fennel, Marygold: plant Shalot, Garlick; (but if it was planted in October it will be much better) Potatoes, Skirrets. Sow Onions, Lettice, Creſſes, Parſnips, Fetrave, Radiſh, &c. And on the hot-bed Collyflowers, and, if you pleaſe, Cucumbers, &c.

Slip and ſet Phyſic-herbs, July-flowers, and other fibrous rooted flowers. Be careful of the tender; the piercing colds are now on foot. Turn your fruit in the room, but open not yet the windows.

Catch Moles, Mice, Snails, Worms; deſtroy Frog's-ſpawn, &c.

Half open paſſages for Bees; they begin to ſit, keep them cloſs night and morning; yet you may remove them.

This month affords us very little variety of Herbs for the table, for now the winter ſtores are almoſt ſpent, and the roots which have been hitherto uſeful, are hard and ſtringy; and beſides, an underſtanding gardiner muſt, at this ſeaſon, new-crop his ground with herbs and roots, for the ſucceeding months.

In March, if your ground be great, and the number of labourers proportionable, you ſhould have the pleaſure with one caſt of your eye to ſee them Digging, making up, Sowing, Planting, Hoeing, Weeding, Grafting, Pruning, &c. For, in fine, before the month be out, the moſt part of the ground ſhould be taken up either with Seeds or Plants, which are to ſerve for proviſion for the whole year. All the ground before covered with dung, ought to be diſcharged of its coverings, which are now grown noiſome, as ſoon as they ceaſe to be neceſſary; and every thing ought to breathe the free air, which begins now to cheer both Animals

Animals and Plants; you ſhould, at this time, have at leaſt ſomething to begin to gather, either of Sallads or Radiſh, of the new ſeaſon.

Garden diſhes and drinks in ſeaſon.

BOth green and houſed Herbs and roots: alſo pickled, houſed, and conſerved Fruits; with their Wines as in the former months.

APRIL.

PLant Holly, Yew-hedges, and Hawthorn too, if not too forward. Ply and ſheer Hedges. Nail and prune Wall-trees, *&c.* Plant Firs, and other greens. Slip and ſet Sage, Roſemary, Thyme, Rue, Savory, and all other fibrous rooted Herbs and Flowers. Uncover and dreſs Strawberries. Plant Artichokes, ſlip them and delve their plots. Set Cabbage, Beans, Peaſe, Kidneys. Sow Aſparagus, Parſly, Beets and Beet-card. Set Garlick, Shalot, Potatoes, Skirrets, Sorrel. Sow Onions, Leeks, Lettice, Creſſes, Radiſh, Orach, Scorzonera, Carvy, Fennel, *&c.* And on the hot-bed Cucumbers, Collyflowers, Purſlain, ſweet Marjoram, Baſil, Summer-ſavory, Tobacco, *&c.*

Set Strawberries, Violets, July-flowers, *&c.* Alſo ſow the Seeds of July-flowers, *&c.* Sow all your annual Flowers, and rare plants, ſome requiring the hot-bed. Deſtroy Moles, Mice, Worms, Snails. Lay, beat, roll and dig Gravel, and ſow Graſs. Begin to your mowing and weeding.

Open the doors of your Bee-hives; now they hatch.

The weather is commonly unſettled in this month, the nights frequently froſty, and blighting winds from the eaſt are ſtill to be expected. The new moon of this

this month, which the French call the Ruddy Moon, is for the moſt part attended with deſtructive and violent winds, which endanger the tender ſprouts of plants, and young-knit fruit; therefore gardiners ought to be careful how they yet expoſe any Houſe Greens, or Exotick Plants to the open air, or depend too much upon the fair promiſe of a warm day or two.

If the weather be dry and windy, ſtake up all new planted Trees, if that work was neglected in the preceeding month, watering them well once in ten days; and fence your ſpired ſeedling Onions from the winds, for they are eaſily broken.

It is now that our gardens begin to over run with Snails and Slugs to the great deſtruction of our young-knit Wall-fruit and the Greens of the Kitchen-garden. Many ways have been preſcribed to remedy this evil, as to lay Tobacco-duſt, Soot, Saw-duſt or Barley-chaff round about the ſtems of Plants, which indeed will keep them off for a little time, but the firſt rain that falls, gives them full liberty to paſs over theſe fortifications: neither are we more ſucceſsful in putting Tar upon the ſtems of Trees; for a few warm days dry it up: But the moſt ingenious contrivance to keep off theſe deſtructive vermin that I have ever met with, I learn'd from a curious gentleman of Hertfordſhire, which is ſo cheap and eaſy, and ſo much to the purpoſe, that I believe few lovers of gardens will be without it.

He directs to wrap about the ſtem of a Tree, two or three rounds of line or rope made of Horſe-hair, ſuch as are commonly uſed to hang clothes upon; theſe are ſo full of ſtubs and ſtraggling points of the hair, that neither a Snail or Slug can paſs over them, without wounding themſelves to death: ſo that the head of the tree, if it be a Standard or Dwarf, can receive no harm from them: if we ſecure a Wall-

tree,

tree, we muſt yet uſe a little more caution; for beſides preventing their paſſage up the ſtem of the tree, we muſt faſten one of theſe ropes cloſe to the wall, ſo as to incloſe all the branches of the tree, and allow ſpace enough to nail up the ſummer-ſhoots within the compaſs of the hair-line. Steep theſe hair-lines, before you uſe them, twenty four hours in Vinegar and Gall, whereby all thoſe vermin will be deſtroyed immediately.

In Eſpaliers of Fruit-trees, it is only neceſſary to wrap theſe hair-lines about the ſtems of trees near the roots, and about the bottom of every ſtake, which work ſhould be done in the winter, when the Snails are laid up in their cloſs-quarters.

To preſerve Colly-flower plants, or other tender Herbs, which are liable to be deſtroyed by Slugs or Snails, the hair-lines may be faſtened about the edges of the beds they are planted in. It is to be remarked, that theſe lines are beſt for this uſe when the hair they are made of is very ſhort, for then they will be full of points, and compleatly armed againſt any attempts of theſe murdering vermin.

The ground is now in good order to receive the ſeeds of Thyme, and ſuch aromatic herbs; and this work ſhould not be delayed longer than the laſt week of this month. Obſerve, that all ſmall ſeeds muſt be ſown ſhallow in the earth, and the larger ſeeds deeper in proportion, and again, as the ground is more light and ſandy, every ſort muſt be ſown deeper than in heavy ſoils.

We may continue to make plantations of Strawberries till the middle of the month, placing the plants about eight or ten inches apart.

If the weather be moiſt, it is not too late to make layers of Jeſſamine, Honey-ſuckle, Roſes, and ſuch like ſhrubs.

Sow Sellery upon the natural ground, or upon ſome decayed hot-bed, to ſucceed that ſown in March.

Sow now Spaniſh Chardones in the natural ground for a ſecond crop; make holes for the ſeeds at about five or ſix foot diſtance; put four or five ſeeds in each hole, and when they are come up, leave only one ſtrong plant growing in a hole for blanching.

Make ridges for Cucumbers and Melons, for a full crop, and prune off the ſuperfluous branches from the Melon-plants upon the forward ridge: But do this carefully, without lifting up the runners from the ground; for the leaſt diſturbance of that kind is apt to bruiſe the tender branches, which often ends in the loſs of the whole plant.

Water well your Strawberries, while they are in bloſſom, two or three times a week, if the weather be dry; this muſt be done in the morning.

Garden diſhes and drinks in ſeaſon.

ONions, Leeks, Coleworts, Beets, Parſly, and other herbs: Spinage, Sorrel, Scorzonera, green Aſparagus, Lettice, Radiſhes, and other ſallads: Creſſes, pickled Artichokes, Beetrave, Barberries, Cucumbers.

Houſed Apples and Pears, conſerved Cherries, Plums, Peaches, Apricocks, Gooſberries, Currants: alſo the wines of Apples, Pears, Cherries, Liquoriſh, Honey, &c.

MAY.

PULL up Suckers, and hoe about the Trees: rub off unneceſſary buds: ſheer or clip hedges: prune tender greens, not the roſinous; bring forth the houſed ones, refreſhing and trimming them: plant

plant all ſorts of medicinal herbs: ſow all the ſweet ones which are tender.

Gather Snails, Worms, &c. catch Moles.

Sow Lettice, Creſſes, Purſlain, Turnips, Radiſh, Peaſe, *&c.* Continue weeding and watering.

Near the end, watch the Bees ready to ſwarm.

Altho' in this month the ſeaſon is ſo far advanced, as to bring many plants to their higheſt perfection, and nature ſeems to be dreſs'd in her wedding garment, the garden is yet ſubject to many hazards from froſty nights, and cold blaſts, which oftentimes happen in the firſt fifteen days: we have ſeveral times ſnow in this month; and though ſnows are uncommon at this ſeaſon, yet the ſhowers which frequently fall towards the beginning, are often mixed with hail, which I account the moſt pernicious offspring of the weather, with reſpect to Vegetables, as their leaves and young fruit are then tender, and very ſubject to be bruiſed by every little accident of that kind. It has been a rule among gardiners, about the middle of this month, to expoſe, or bring abroad their exotic plants, and ſuch tender ſhrubs as the uncertainty of the weather, in the preceeding months, confined within doors; and I have obſerved, we ſeldom have any weather ſo unfavourable to plants after the fifteenth, as to do them any prejudice.

If ill weather, or other accidents has prevented a Gardiner from performing what is recommended for the work of the laſt month, let him delay no longer than the firſt week of this; for now the ſeaſon is ſo far advanced, that a day loſt is equal to a week in the three preceeding months.

Now look to your Melon-ridges, as well thoſe made in February, as thoſe which were planted in the laſt month, weeding them, and carefully pruning off the water-branches, which are known by their flatneſs and

extraordinary breadth: it is alſo adviſeable to pinch off the tops of ſuch runners as have fruit upon them, leaving three or four joints always beyond the fruit, and particularly taking care that every fruit be ſufficiently ſheltered with leaves; for to expoſe them to the ſun while they are ſmall, ſpoils their Growth. It is ſuppoſed that a Melon is about forty days between the time of its ſetting and ripening; and as it is preſcribed, that fruit is to be ſhaded by the leaves during the time of its growth, ſo when that is perfected, we cannot expoſe it too much to the ſun for ripening, if we would have it well taſted.

If the ſeaſon be dry, rather float the alleys between the Melon-ridges, than pour water upon the plants, or near the ſtems; for the uſe of watering is to feed the extreme fibres of the roots, which are the only parts of a plant by which it receives its nouriſhment; and theſe fibres in Melon and Cucumber-plants always run as far as the branches. The inconveniencies which attend the wetting the leaves or ſtems of theſe plants, are either that they rot or mould by the wet lying long upon them, or elſe they are ſcalded, if the ſun ſhines hot.

The water for this uſe ſhould be as ſimple as poſſible; for, all waters prepared with hot dungs breed Inſects among plants, which often deſtroy them: Pond water which lies expoſed to the ſun, I take to be the beſt, and even that ought to be given but in ſmall quantities to a Melon; for much wet ſpoils its flavour, but Cucumbers are great lovers of it.

In the beginning of this month ſow Cucumbers in the natural ground, about ten or twelve ſeeds in each hole, for fear of Diſappointments; but leave only four or five when they are come up: let the earth be freſh and well wrought with a ſpade, rather light; for in ſtiff ſoil the fruit is apt to ſuffer by worms;

this

this ſowing will afford us plenty of fruit in Auguſt, as well for pickling as to eat with ſallads; a plantation of this kind producing near twice as much fruit as one of the ſame quantity of ground forced with dungs.

Gather carefully the neſts of Caterpillars, and other inſects which annoy your trees, and prune off all crumpled leaves and twigs, for they harbour the worſt of vermin, although they are ſcarce viſible without the help of microſcopes: this work is the more neceſſary, becauſe, as Mr. Richard Bradley informs us, every inſect increaſes yearly about four hundred, and ſome of them many more; for example, thoſe Caterpillars which feed upon the Cabbage, and change into the common white Butter-flies, breed twice every year, each of them laying near four hundred eggs at one time; ſo that from the ſecond brood of one ſingle Caterpillar, we may reaſonably expect one hundred and ſixty thouſand.

Garden diſhes and drinks in ſeaſon.

COLEWORTS and other Herbs, being eaten with contentment, are better than a fatted ox without it; Sage with butter, Leeks, Parſly, Thyme, Marjoram, Sorrel, Spinage, *&c.* Scorzonera, Aſparagus, Lettice, Purſlain, and other ſallads and pot-herbs.

Pickled Artichokes, Barberries, Beetrave, Cucumbers; houſed Apples and Pears for many uſes; early Cherries, and Strawberries near the end.

Cyder, Metheglin, Liquoriſh-ale, *&c.*

JUNE.

CLEANSE, about the roots of trees, ſuckers, and Weeds; water their covered bulks, eſpecially the new-planted.

Fell the ſmall ill-train'd Foreſt-trees in the nurſery, within half a foot of the ground; but this work ſhould rather be performed in April, as will appear from the long experience of an author, who is ſoon to publiſh his practice in raiſing Foreſt-trees: Unbind graffs: Prune all Wall and Standard-trees; towards the end you may inoculate, and increaſe by circumpoſition.

Gather Elm-ſeed, and ſow it immediately.

Tranſplant Colly-flowers, Coleworts, Beets, Leeks, Purſlain, *&c.* in moiſt weather; at leaſt water firſt the ground, if dry.

Sow Peaſe, Radiſh, Turnip, Lettice, Chervil, Creſſes, *&c.* Deſtroy ſnails, worms, *&c.*

Begin to lay Carnations or July-flowers; ſhade, ſupport and prune ſuch as will blow; water pots and thirſty plants; take particular care of your Auricula-pots to ſhade them and keep them from much wet, as they are now at their weakeſt ſeaſon, immediately after the bloom of their flowers is over: weeding and mowing is in ſeaſon, and ſo is diſtillation.

Bees now ſwarm; look diligently to them.

The method I have taken in the preceeding months, in giving a ſhort account of the weather, which may reaſonably be expected every month, was chiefly deſigned to ſtir up the Gardiners to a neceſſary care of ſuch of their plantations, as are the moſt ſubject to be injured by uncertain ſeaſons: but as the foregoing months required, that we ſhould uſe our greateſt ſkill and diligence to guard againſt froſts; ſo now we ought, with the greateſt application, to uſe proper methods for defending our plantations from the too violent ſcorchings of the ſun, and have a watchful eye upon ſuch plants eſpecially as have been lately tranſplanted, and refreſh them with moderate waterings about their extreme fibres; for to give them wa-

ter

ter too near the ſtem, does them little good: this work ought now to be done in the evenings.

Continue to mow graſs-walks early in the morning, and after rain; alſo to deſtroy weeds as in the former months.

It is now a proper time to clip edgings of box, *&c.* eſpecially after rain; but if the weather be dry, gather herbs for drying, to lay up for winter-uſe, ſuch as Sage of Vertue, Mint, Carduus, Thyme, Lavender, *&c.*

Cut no Aſparagus after the firſt week in this month, for it will impoveriſh the roots.

The ſeaſon is now very proper for the budding or inoculating of Peaches, and other ſtone-fruits.

Garden diſhes and drinks in ſeaſon.

COLLY-FLOWERS, Beets, Parſly, Sorrel, and other Pot-herbs; Purſlain, Lettice, and other Sallads; Raddiſh, Scorzonera, Aſparagus; green Peaſe and Artichokes; green Gooſberries, ripe Cherries, Raſps, Currans, Strawberries. Houſed Apples and Pears. Cyder, Metheglin, *&c.*

JULY.

FALLOW Ground as ſoon as the crop comes off: Prune and purge all Standard-trees: pinch off with your fingers the out-branches of your Wall-trees: pull up ſuckers and weeds: hoe and water when needful: inoculate fruit-trees, ſhrubs, ever-greens, flower-trees; increaſe the ſame by laying: clip your hedges after rain: ſuffer ſuch herbs and flowers to run to ſeed as you would ſave, cutting the reſt a hand-breadth from the ground.

Sow

Sow Turnip, Radiſh, Lettice, Onion, Colly-flower, Cabbage and Coleworts in the full moon: near the end, ſow Beets, Spinage, *&c.* You may plant Strawberries, Violets, Camomile: lay July-flowers, plant their ſeedlings: ſlip and ſet Hypaticas, Bears-ears, Cowſlips, Hellibores, *&c.* Sow at the full moon all the ſorts of Stock-july-flowers and Wall-flowers, and, after they are come up and have attained five or ſix leaves, tranſplant them into pots or boxes, which may be put under cover during the winter, to keep them only alive, and in the ſpring plant them out for good. Take up bulbous and tuberous ones that are dry in their ſtalks, if you intend to change their places, and keep till September; but ſome ſhould be ſet immediately.

Supply voids with potted annuals: lay graſs and gravel: make Cherry and Raſp-berry-wine, *&c.*

Prevent the Bees latter ſwarms by putting an eik to the hives; kill Drons, Waſps, *&c.*

We are now arrived at that happy ſeaſon, which affords us almoſt every variety the garden can produce: If the Gardiner has been diligent in the preceeding months, he now meets the reward due to his ſkill and labour: we have little rain at this time, and the weather very hot; therefore your greateſt care muſt be to water carefully all new planted trees and herbs, ſo as to nouriſh their outward fibres, as is before directed: the hours of general watering in this month, are from five in the morning till eight; and from five in the afternoon till eight or nine in the evening; but in particular places, which have the benefit of ſome wall or hedge to ſhade the ſun from them, we may take other times of the day, obſerving the motion of the ſun, that his beams do not reach them till at leaſt two hours after watering; for the extream heat of the ſun at this time of the year, would ſcald a new-watered plant, if we did not allow a ſufficient

cient time for the moiſture to ſink into the ground before the ſun come upon it.

Truſt not too much to the ſudden ſhowers which may now fall, for they are of little help to the roots of plants; neither neglect to water thoſe plants which ſtand abroad in pots or boxes, for they have yet leſs benefit from the rains in this ſeaſon, than the plants in the open ground.

Delay not to gather ſuch ſeeds as are fully grown and coloured in their huſks, eſpecially Auriculas, Hyacinths, Polyanthus, or Ranunculus ſeeds; pulling up the whole plants, and ſetting them upright in a houſe, till the ſeed-pots are dry; for were we to wait till the huſks open before we gather them, great part of the ſeed would be loſt. This way of gathering of ſeed is commonly practiſed; the moiſture in the plants, and a little ſun, will perfect the ſeeds, and they are ſubject to no hazard from birds or wet weather.

Sow Carrots, Turnips and Onions to ſtand the winter: earth up Sellery in drills, and plant out a new parcel to ſucceed the former: plant out what Colly-flowers you have yet remaining, to bloſſom in the Autumn.

Guard againſt Waſps and other Inſects, which now devour your fruit, by placing phials of honey and ale near your fruit-trees; and by ſeveral other ways you may ſoon catch a large quantity of them: Once every week renew the bottles; and above all, take care to bruiſe the inſects you take out of them; for tho' they are ſeemingly dead, I have known a warm day or two bring them to themſelves; therefore take care how you throw them away.

There is no time more proper to war againſt Ants, and other ſuch deſtructive vermin than this month; they are now all abroad, and may be taken.

Be

Be careful to pick off all crumpling leaves wherever you ſee them, and the very twigs themſelves if they are curled; for they are the beds of deſtructive creatures.

I the more particularly recommend the deſtruction of theſe devouring vermin, becauſe of their wonderful increaſe, eſpecially the ſmaller kinds of them, ſuch as infect the Colly-flower, whoſe eggs are five hundred times, as Mr. Richard Bradley informs, leſs than the leaſt grain of ſand, and many thouſands of them in number laid from that ſingle inſect; ſo that from a ſecond generation of them, they are ſo numerous, that if every egg which one might find upon a blighted Colly-flower, was a globe of an inch diameter, they would fill more ſpace than the whole terreſtrial globe: the wonderful ſmallneſs of the eggs of thoſe creatures, I confeſs, may ſeem very ſtrange to thoſe who are unacquainted with the uſe of microſcopes; but this is no more curious, than what the late famous Dr. Hook has taught us in his works, where he mentions the ſeeds of Moſs, which were ſo ſmall, that ninety thouſand of them being laid together in a ſtraight line, did not exceed the length of a Barley-corn; and that one thouſand three hundred and eighty two million, four hundred thouſand of them, would weigh only a grain.

About the 28th, ſow ſome Colly-flowers to ſtand the winter: for the right ſeaſon for this work is chiefly to be regarded, if we propoſe to have good flowers early in the ſpring; for ſowing them only a few days ſooner or later, makes them either run before their time, or come much later or weaker than they ought to do: If the winter be mild, and the plants are ſet cloſs together, many will run up to ſeed; and if ſharp froſts, and a rough ſeaſon begins in November, ſome of this ſowing will make good forward plants: however, I adviſe to ſow again the firſt week of the next month;

month; ſo that from theſe two ſeminaries, it will be morally impoſſible to miſs of a crop to our mind.

Take up Shalots, Garlick, and gather Rocambole when the ſtalks turn yellow.

Garden diſhes and drinks in ſeaſon.

BEETS, and many Pot-herbs and ſweet Herbs. Purſlain, Lettice, Endive, *&c.*

Cabbage, Colly-flower, Scorzonera, Beetrave, Carrot, Radiſh, Turnip, Peaſe, Beans and Kidneys: Artichokes, Strawberries, Raſps, Currants, Gooſberries, Cherries, Plums, ſummer Pears and Apples, Cyder, Metheglin, and other wines.

AUGUST.

FALLOW borders, beds, nurſeries, and the bulks of trees; yet inoculate: ply and purge trees: pull up ſuckers and weeds: clip hedges: gather the Black-cherry-ſtones and make them up for fruit-trees upon walls, where the young trees are to be planted in October or November. Gather Mezerion-berries: gather the ſeeds of moſt herbs and flowers: cut your phyſic herbs. In the beginning ſow Cabbage, tho' I confeſs it is rather a ſeaſon too late, Spinage, Black Radiſh, Chervil, Lettice, Corn-ſallad, Endive, Scorzonera, Carvy, Marygold, Angelica, and Scurvy-graſs, *&c.* Take up ripe Onions, Garlick and Shalot: Unbind buds inoculated: Cut and ſtring Strawberries: Lay July-flowers: ſow Columbines, Holly-oaks, Larks-heels, and ſuch as can endure winter.

Take up your Bulks, and plant as in the laſt: ſift the ground for Tulips and Gladiolus: plunge potted Annuals into vacancies: keep down weeds by hoeing,

ing, &c. Lay graſs and gravel; beat, roll and mow well; make Gooſberry and Curran-wines, &c.

Towards the end, take Bees, and the lighteſt firſt; thoſe who are near heaths may differ a little: Deſtroy Waſps; ſtraiten the paſſage, by putting on the hecks to ſecure from robbers.

In the firſt part of this month, the weather is commonly hot and dry, ſo that watering is ſtill neceſſary; but at the latter end we are not without danger of froſty nights; and I have obſerved, that then alſo our firſt rains begin.

We may water in the evening till the fifteenth; and after that, if there is occaſion, the morning is to be preferred for that work, for fear of froſt.

The firſt week, ſow a ſecond crop of Colly-flowers to ſtand the winter, leaſt the firſt ſhould run to ſeed, which they will be apt to do, if we have an open ſeaſon till Chriſtmas, or the ground be light and lie in a bottom.

Now break off the ſtems of ſuch Artichokes, to the ground, as have done blowing.

Sow Creſſes to ſtand the winter; they will heighten the taſte of theſe ſallads which are gathered upon hot-beds in December and January, &c.

Give more earth to your blanching Sellery, and continue to raiſe the earth about it every fortnight. In dry weather only mind to gather what ſeed you have ripe.

Yet continue to deſtroy weeds, and ſuch vermin as annoy the trees.

Till the fourth of this month, we continue to ſow Turnips in the open fields; for theſe roots not only yield a profitable crop, but very much enrich all light ſoils.

Towards the end, ſlip and ſet aromatic herbs, as Savory, Thyme, Hyſop, &c. and cut down thoſe which

which are run to ſeed, within three or four inches of the ground.

Garden diſhes and drinks in ſeaſon.

MANY pot-herbs and ſallads, Cabbage, Colly-flower, Beetcard, Turnip, Radiſh, Carrot, Beettrave, Scorzonera, Peaſe, Beans and Kidneys, Artichokes, Cucumbers, Apples, Pears and Plums of ſeveral kinds, Apricocks, Geens, Gooſberries, Currans, Raſps, Strawberries, &c.

Cyder, Metheglin, Cherry-wine, Curran-wine, Gooſberry-wine, Raſp-berry-wine, &c.

SEPTEMBER.

FALLOW, trench and level ground; prepare pits and borders for trees; gather in the laſt week of this month Plane-ſeed; gather ripe fruits; plant forth Cabbage; alſo plant Bulbs; refreſh, trim and houſe your tender Greens; refreſh and trim pots and caſes with July-flowers and other fine flowers and plants, carrying them to ſhades for ſhelter; and cover them, giving them air at all proper occaſions, ſuch as in ſoft weather in winter.

Towards the end gather Saffron.

Make Cyder, Perry, and other wines, &c.

Straiten the entrance to Bee-hives; deſtroy waſps: Alſo you may now remove Bees.

In this month the gardiner has great variety of buſineſs, and muſt employ his head as well as his hands towards furniſhing his Kitchen-Garden with every thing neceſſary for winter-uſe. The ſhowers which are ſeldom wanting at this ſeaſon, prepare ground for the reception of many plants and ſeeds, and the great heats alſo declining, give us now opportunity of re-

planting many things which would have been endangered by removing in the preceeding month.

At the beginning hough Turnips the firſt time. If the weather be dry, gather ſuch fruits as are now ripe upon the trees, and ſuch others as are full grown, and in good condition to be laid up in the houſe, for the uſe of the following months: ſuch Pears or Apples as are fit to gather, will eaſily leave the tree; therefore uſe no violence to pull them off; for ſuch as do not willingly part from the tree, will ſhrivel and have an inſipid taſte.

Gather ſuch ſmall ſeeds as are now ripe, according to the former directions: gather Leek-ſeeds, if the ſeeds are black, cutting the heads from the ſtems; and ſpread them upon a ſheet every day in the ſun, till they are fit to be rooted out.

Gather the pods of Garden and Kidney-beans, and expoſe them to the ſun for drying, to be laid up till the ſpring, or the time you would uſe them; and let them not be taken out of the ſeed-pods till your ground be ready for them, for the pods preſerve the ſeeds.

The Cucumbers which are now full ripe, muſt be cut open, and the ſeeds and pulp taken out of them, to remain together two or three days before they are waſhed clean: the ſeeds may then be kept in water twenty four hours, and laid to dry in the ſun ten days: be ſure all ſeeds are thoroughly dry before they are laid up, or they will rot.

We may yet replant Endive, and all ſorts of fibrous rooted herbs; continue to earth up Sellery dry; make plantations of Cabbages and Coleworts. Tis now a good time to tranſplant Strawberries.

Tranſplant young Colly-flower plants, in places where they are to flower, under ſome warm wall, or place for ſhelter; thoſe which are now planted out for good

good, will bloſſom above fifteen days ſooner than thoſe which are planted in the ſpring, and will produce much larger flowers if they can be preſerved through the winter.

Garden diſhes and drinks in ſeaſon.

VARIETIES of pot-herbs and ſallads, Cabbage, Colly-flower, Peaſe, Beans and Kidneys, Artichokes, Beetcard, Beetrave, Scorzonera, Carrots, Turnips, Radiſh, Cucumbers, Apples and Pears of many kinds; Apricocks, Peaches, Nectarines, Quinces, Grapes, Barberries, Filberds.

Cyder, Liquoriſh-ale, Metheglin, and wine of Cherries, Raſps, Gooſberries, Currans, &c.

OCTOBER.

GATHER winter fruits; trench and fallow ground, mixing with proper ſoil to ly over the winter; prepare dungs and manures, mixing and laying them in heaps, bottom'd and covered with earth; plant Hawthorn-hedges, and all trees that loſe their leaves; alſo lay their branches; prune Roſes; gather ſeeds of Hazel, Hawthorn, Plane, Aſh, Beech, Oak, Apple, Pear, &c. Cut Strawberries, Artichokes, Aſparagus, covering their Beds with dung and aſhes; earth up winter-ſallads, herbs and flowers a little; plant Cabbage, &c. plant Tulips, Hyacinths, Oriental-narciſſus', Daffodills, Colchicums, Crocus, Colchicum-vernum, Winter-aconites, Snow-drops, Frittillaries, Denſcanis, Iris Engliſh and Spaniſh, Gladiolus', &c. and other Bulbs; ſow the ſeed of Bears-ears, Cowſlips, Tulips, Iris and Hyacinths, &c. beat and roll Gravel and Graſs; finiſh your laſt weeding and mowing; lay bare leopar tree-roots, and remove what harms

them; alſo delve and dung ſuch as require it; drain exceſſive moiſture wherever it be; pickle and conſerve fruits. Make Perry and Cyder.

You may now ſafely remove Bees.

We ought now to make uſe of every opportunity to compleat our Plantation of herbs for winter uſe: the greateſt part of this month we may expect tolerable weather; but after that, our chief buſineſs will be, to ſecure from the ſeverities of the ſeaſon, all plants which are in danger of being injured by the froſts and high winds.

Take up thoſe Colly-flower-plants which begin to flower; tye their leaves together, and bury their roots and ſtalks in ſand, in a cellar or ſome cold place: the flowers will increaſe in bigneſs, and remain good for ſome months.

Alſo cut Artichokes with long ſtalks, and preſerve them in the houſe, ſetting their ſtalks in ſand.

'Tis now the ſeaſon to lay up roots for winter ſtore, ſuch as Carrots and Parſnips; and ſome Gardiners alſo think it beſt to take the roots of Turnips out of the ground, and lay them in ſand: but, I rather chooſe to leave the Turnips in the ground, until we are ready to uſe them; and for the other two kinds, I preſcribe the following method: make choice of a dry part in your garden, and there dig a trench about eight or ten inches deep, into which, without mixture of earth or ſand, lay your roots cloſe together, firſt cutting off their green tops and growing buds, and then cover them about ſix inches thick with wheat ſtraw ridge-ways. We may this way preſerve them fit for uſe till the following June.

'Tis now the beſt time of the year for tranſplanting of Fruit-trees, altho' their fruit be upon them: but I would rather chuſe that their fruit were off, or taken off them before tranſplanting them.

Tranſplant

Tranſplant Foreſt-trees of all ſorts from the beginning to the end of this month; the Elm eſpecially about the firſt week, altho' its leaves are then very green.

About the middle of this month ſow the Cyder preſſings in beds of freſh earth, to raiſe ſtocks for grafting, or even making of orchards without graffing. From a nurſery of this kind, we raiſe as many different ſorts of Apples as we raiſe plants, altho' the ſeed come all from the ſame tree; ſo much is nature pleaſed with variety.

And it may be, was the earth more conſtant and uniform in its productions, its vegetative power would be too ſoon exhauſted; for I conceive, were all Apples exactly the ſame, they would all draw that very ſame nouriſhment from the earth, and the like with every tribe of vegetables; but this variety ſeems to determine, what I have often thought, that there are as many diſtinct qualities in the earth, as there are different kinds of plants growing upon it, and that each plant can only take out of the earth that ſpirit which its parts are naturally prepared to receive, and leave the others undiſturbed. If the generation of plants is allowed, as the forementioned Mr. Richard Bradly explains in the firſt Part of his New Improvements, the vaſt variety in plants ſeems to proceed from the coupling of one plant with another; and that the *Farina fœcundans* of one ſort being conveyed by the air, and lodged upon the female parts in the bloſſom of another tree, changes the properties in the ſeed which it impregnates, ſo as to make it produce a tree differing from the mother-plant.

Now lay up ſome Acorns and the maſt of other timber-trees in dry rooms.

Towards the end, earth up and dreſs Artichokes; it is a common cuſtom with Gardiners to dreſs Arti-

chokes with hot dung, or dung which comes from the ſtables; but this is a very wrong practice; for the hot dung hurries on the plants to vegetate at a bad ſeaſon of the year, when the froſt will cut off the young fruit, and this makes them late in fruiting in the ſpring: but the beſt method is to earth them up with their own earth, or a little very old hot-bed dung, laid above the earth which ſurrounds them; and cover your Aſparagus-beds with long dung; but ſee it be old ſtanch dung, to preſerve them from the ſeverity of the winter.

Garden diſhes and drinks in ſeaſon.

COLEWORTS, Leeks, Cabbage, Colly-flowers, Onions, Shalot, Beans, blanched Endive and Sellery, pickled Aſparagus, Purſlain, *&c.* Scorzonera, Beetrave, Carrots, Turnips, Parſnips, Potatoes, Skirrets, Artichokes, Cucumbers, Apples, Pears, Plums, Almonds, *&c.*

Cyder, Perry, and wine of Cherries, Currans, Gooſberries, Raſp-berries; ale of Liquoriſh, Metheglin, *&c.*

Of POT-HERBS, and ſuch as are commonly uſed for DISTILLING.

THAT there may not be any thing omitted that is proper to be done in the Kitchen-garden, 'tis thought neceſſary to treat of ſuch plants and herbs as are commonly uſed for diſtilling, and are ſometimes dry'd for the uſe of the kitchen; and firſt of ſuch as are Aromatics.

Roſemary and Lavender are both durable plants and ever-greens; they love a light ſandy ſoil, and are both

both raiſed from ſlips planted in April; quickly taking root, if they are ſhoots of the laſt year, but will not grow if they are older: They are apt to ſuffer by the froſt, eſpecially if they have too much wet, and therefore ſhould be planted chiefly in the drieſt parts of the garden, where they may be the moſt expos'd to the ſun. Lavender makes a fine edging in large walks, if it be often clip'd; but for the ſake of its flowers, which are often uſed, we muſt have a plantation of it apart; for were the edging plants ſuffered to flower, their beauty would be ſpoil'd.

Thyme and Hyſſop are either raiſed from ſeeds ſown in March or April, or propagated from Slips planted in theſe months: we have many ſorts of Thyme of various ſcents and uſes; the Pot-thyme, Lemon-thyme, and a ſort with variegated leaves are moſt commonly cultivated, and make very good edgings that will laſt ſeven or eight years: and beſides them the Maſtic-thyme, and the Marum Syriacum or Cat-thyme, are cultivated in many gardens, for the ſake of their refreſhing odour; but the latter, if it is in ſmall quantities, muſt be carefully defended from the cats, who love to eat it, and are intoxicated with it; but I obſerve, where it is in abundance the cats never diſturb it. Theſe two laſt kinds ſhould be planted in the warmeſt parts of the garden; the others will grow any where.

Sage has many varieties; but we propagate only three ſorts of it, *viz.* The Red-ſage, the Tea-ſage, or Sage of Virtue, and the Wormwood-ſage; theſe kinds are raiſed from ſlips taken from the roots about the beginning of April, and planted a foot apart in light earth. The Sage of Virtue ſhould be cut for drying, when it is full of young ſhoots, for thoſe only are fit to make Tea of; they ſhould be gathered in a dry day about noon, and laid to dry in the ſhade

to

to be preſerved for uſe. I have been often told, that the Wormwood-ſage is preferable to the former, affording a pleaſanter liquor, and more grateful to the ſtomach.

We ſeldom meet with more than two ſorts of Rue in our gardens, and their difference only conſiſts in the colours of their leaves; the one being variegated with cream colour, and the other of a plain green: this plant delights in ſhady places, and is eaſily multiplied by ſlips ſet in April in a light ſoil. In times of peſtilence this plant has been much in requeſt, believing it prevents infection.

Mint or Minth, and Baum, ſhould neither of them be wanting in a Kitchen-garden; they are propagated by parting their roots any time in the ſpring, and will grow any where. Mint indeed is more generally cultivated than the other, as it is of it ſelf a pleaſant Sallad, and good in ſoops and ſome ſauces, beſides its extraordinary uſe in diſtilling; When it is about a foot high, it ſhould be cut to dry in bunches for winter-uſe, obſerving this as a general rule, to cut every herb deſign'd for drying in a dry day, and then to dry it in the ſhade.

Some Gardiners think it worth their while to plant ſome large roots of Mint in the corners of their hot-beds about November, that they may have young ſhoots of it to mix among their winter-ſallads in February.

Tanſy is increaſed by parting the roots in the ſpring, and is a plant ſo valuable, that it muſt not be wanting: ſome of it ſhould always be kept dry in winter, eſpecially for the uſe of thoſe who are afflicted with the Gout in their ſtomach: it is of that ſovereign efficacy in that Caſe, as I have found by experience, that I think I ſhould be guilty of ill-nature, if I was to paſs by this opportunity of making known the me-

thod

thod of uſing it. Boil half a handful of this herb in half a mutchkin of ſtrong white-wine, and drink this decoction as hot as poſſible; I have always found it to remove the pain in leſs than a quarter of an hour.

Wormwood is either raiſed from ſeeds or ſlips planted in March; it will grow in any ſoil, and be apt to over-run the ground, if it be eaten by hogs when the ſeeds are ripe, which paſſing through their bodies germinate and come up very quickly.

Penny-royal and Camomile are uſeful herbs, and very well deſerve a place in the garden; they delight in moiſt ſhady places, and proſper beſt in a ſtiff ſoil; they are both propagated from ſlips planted in March or April.

We have two kinds of Marjoram commonly propagated in gardens; one ſort called the Winter Sweet-marjoram, which will reſiſt our froſts, and remain good two or three years without renewing; but it will be proper in ſevere winters to have ſome of theſe Plants in Pots, which you can preſerve under hot-bed frames, provided they are kept warm; the other is ſown annually upon the hot-bed in March, not being able to defend it ſelf from the violence of our winters: the firſt kind is increaſed by planting the ſlips about March or April in moiſt places, but has not that agreeable ſcent which we find in the other; therefore ſome of the laſt ſort ſhould be tryed every year when it is grown pretty large.

Carduus is raiſed from ſeeds ſown either the middle of Auguſt, or in March; but I commend the autumn plants before thoſe rais'd in the Spring, as they are much larger, and more vigorous than the others, and beſides have a much better ſeaſon to dry in.

Angelica is rais'd from ſeeds ſown in March in a very rich ground; it is a plant that laſts good for ſeveral years without renewing, and is of great uſe;

the

the beſt method to propagate it is, from its off-ſets planted in a rich ſhady place of your gardens.

Dragons ought alſo to be found in your garden, as well for the beauty of the flowers, as the uſe made of the whole plant in many caſes; it is multiplied by tranſplanting the ſuckers taken from about the root in March: This plant loves a freſh natural ſoil and ſhade.

Fennel and Dill are both propagated alike from ſeeds ſown in the ſpring; they are uſeful herbs, and ſhould not be wanting in a garden; the firſt having its tender ſtalks blanched like Sellery makes a very good ſallad.

Parſly and Clary are alſo very uſeful furniture for a Kitchen-garden, both cultivated with great facility, and raiſed from ſeeds ſown in March, and renewed every year.

Theſe being all the Plants that are required to grow in a Kitchen-garden, it is adviſed that they be planted in ſome place near the houſe, for the conveniency of gathering them with little trouble when they are wanted.

THE FLORIST'S *Vade-mecum*,

FOR THE

Propagating, raiſing, planting, increaſing and preſerving the rareſt FLOWERS and PLANTS.

THE Snow-flower or Snow-drop, is one of the firſt flowers in the year, but very common: there are double and ſingle ones. It flowers in January; the ſingle riſeth out of ſix green leaves; the ſtalk riſeth about ſeven or eight inches high; the flower

flower has three white leaves on the outſide, with three ſhorter tipt with green in the inſide. It loves good ground, and is moſt increaſed by the root. There is another ſort of it called the Donfoly-primalum in the Dutch catalogues; it has a fine ſmell, and is by far preferable to the common ſingle Snow-drop, and requires the ſame culture.

The winter Wolfs-bane, being but an indifferent kind of flower, flowers in February; the ſtalk riſes about ſix inches high, and cometh up through the middle of the leaves, and the leaf is indented with a ſingle yellow flower. It loveth pretty ſtrong ground. It is increaſed moſt by the off-ſets or roots, which muſt be lifted before the leaves are dead, otherwiſe it is difficult to find the root of this flower, they being of an earthy colour.

Crocus or Saffron, is of many kinds and colours; they riſe with narrow green leaves, with a ſmall white line up the middle; they flower in February: you may propagate them by the ſeed, but we have them moſt and beſt by the root or off-ſets. They increaſe very well, and love a light ground, but not too dry.

Primroſes and Cowſlips being of many colours, of which there are a great many common ones in this country, they flower in March, and are loved for their variety of colours: they are propapated by ſeeds or ſlips, and grow beſt in ſhades in moiſt ground. Their ſeed is ſown in September, and comes up in the ſpring. There are now ſuch variety of theſe flowers in England, that their value exceeds that of the fineſt Auriculas, and Mr. Juſtice in his garden at Leith, has by far the fineſt ſorts and beſt collection of thoſe flowers that are now in Scotland, being purchaſed from the beſt floriſts abroad, and of their beſt ſorts.

Noble Liverwort, being of two ſorts, the ſingle and double, of each lighter and darker blue colours.

There

There never was raiſed a double white, but the double Peach colour and the double blues are common; it flowers in March: the flower cometh before the leaves. It loveth a light ſoil, and may be increaſed by ſlips, or ſeed ſown in Auguſt or September.

Hyacinths are commonly Bulbous rooted, with many flat fibres under them, from whence ſpring five or ſix leaves of a light green, tho' at firſt reddiſh. There are many kinds of them, and of different colours; they flower in March and April, and are increaſed from off-ſets of the roots planted in September: they love a good rich ſoil not too moiſt or too dry. For the culture of Hyacinths, ſee Juſtice's Scot's Gardiner, as he has the beſt collection of thoſe flowers in Britain, and has had the greateſt ſucceſs with them both from his ſeedlings and his off-ſets.

Narciſſus and Daffodils; there are many kinds and colours of them; they grow up with tall green leaves, and flower in March and April; they adorn a garden very much, and are admired for their beauty and ſmell. They are propagated from off-ſets of the roots, and love to grow in good ground, and ſhould not be lifted but once in three years.

Bears-ear, is a plant pretty well known in this country; they are indeed very delightful, for their ſurpriſing varieties; they bloſſom in March or April: they are propagated by ſlips, but the different kinds or colours come from the ſeed, which is ſown as ſoon as it is gathered; it endures the winter, and cometh up in March; it muſt be kept from the ſun, for the leaſt blink of the ſun killeth it, particularly the young ſeedling plants, which fitly are expoſed but to one days ſun, will undoubtedly periſh without any poſſibility of recovery. This plant delights in a ſtrong rich ground, and ſomewhat ſhady, but not under the drop

drop of trees. It may be planted in autumn or ſpring.

Dogs-tooth-violet; there are of them white, and red, and fleſh-coloured: it riſes with two ſpotted leaves, a ſtalk about ſix inches high bearing one flower upon it, hanging down the head with ſix narrow long leaves, like to a Cyclamen or Sow-bread, turning up again to the ſtalks, and flowers in March and April. It loves a light ſoil, not dunged, and is increaſed by off-ſets ſet in Auguſt.

The Crown-imperial, that moſt ſtately plant, hath a large yellow root, which has an ill ſmell, and riſeth with a tall ſtalk, adorned with ſmall ſhining green leaves, with twelve or ſixteen flowers, according to the age of the plant, hanging down about the ſtalk. It flowereth in April, and is increaſed by off-ſets ſet in Auguſt upon good light ground.

The double Marſh-marigold is very common in this country; it groweth in meadows or ditches, and proſpers well in gardens. It flowers in April and May.

The Tulip is reckoned one of the fineſt flowers in its prime, for its variety of colours, that is in the world, both double and ſingle; if it had an agreeable ſcent: it is propagated by ſeed ſown in September, which produces many different kinds of flowers, and does not flower till four years after ſowing; and to continue the variegations, take them up every year or two, as ſoon as they have done blowing, and ſet them with their off-ſets in September or October; and if you would have a good product of roots, let their youngeſt roots ſtand two years. They flower in April and May, and love a good warm ſoil.

Fritillaries, whereof there are ſome varieties of colours, have a ſmall round white root, made of two pieces as if join'd together, whence ſprings a

ſtalk a foot high, with ſome green leaves; at the top thereof cometh the flower out amongſt five or ſix leaves, hanging the head downwards. They flower in April and May, and are increaſed by ſeeds ſown after the manner of Tulips in March, and the roots taken up before July muſt be ſet in Auguſt. They love light ground.

The late flowering Bulbous-violet hath a pretty long white root; its ſtalk riſeth a foot and an half high; there cometh from the root five or ſix long green leaves, and it has ſeven or eight flowers on a ſtalk. It flowereth in May. It may be increaſed by ſeeds or off-ſets.

The Stock-july-flower is a plant which laſts two or three years, and needs but little trouble about the increaſe of it; but if you have ſome fine kinds, you muſt lay them for their preſervation; there is a great many ſingle and double kinds got from the ſeed of the fineſt colours of the ſingle ones, with five or ſix leaves, ſown in June, which will be fit for tranſplanting in the autumn, but do rarely blow till the ſecond year. The double kinds may be increaſed by ſlips or cuttings planted in May, June or July. Theſe plants have many branches on a ſtalk, and bear many flowers on a branch; their flowers begin in May, and continue till froſt checks them; the ſcent of their flowers is very pleaſant, and the ſeveral colours of their bloſſoms, if they be well mixt, are very beautiful. They love a warm dry ground.

The Wall-flowers are common; but the double yellow with variegated leaves are very rare: they may be raiſed from ſlips planted in ſhady places, in April, May or June; but the laſt may be more eaſily propagated by ſeeds ſown in May. They flower in May, and love a hot dry ground.

Anemonies,

Anemonies; Of this kind of plant there are many varieties, as well with ſingle as with double flowers. Their colours are chiefly reds, blues, and purples; their bloſſoms open themſelves in April or May. They are very hardy, and may have flowers all the ſeaſon according to their planting: but to preſerve choice Anemony-roots, take them up after their ſpring-bloſſom is over, when their ſtem is withered; keep them dry all the winter, and plant them in February or March. They love a good rich ground ſomewhat light. The ſeeds of the ſingle kinds ripen about the latter end of May, and ſhould be gathered as they begin to crack or ſhow their down. From them may be raiſed innumerable varieties, if they be ſown in February, and lightly covered with earth. Mr. Juſtice has the fineſt varieties of theſe flowers in his garden at Leith that are to be ſeen in Britain, and his Ranunculus's are the beſt that are in this country; as are his Iris's, and, in a a particular manner, the different kinds of his Iris Anglicæ-bulboſæ.

The Crow-foot is eſteemed for its beauty, but not for its ſmell; there are many kinds of it, and it has various kinds of colours; it flowers in April or May. They muſt have better ground than the Anemonies, though planted and lifted the ſame way.

The Flower-de-luce has a bulbous root, ſmaller and greater; it riſeth up with long ſmall green leaves; the ſtem cometh up in the middle about two foot high; it flowers in May and June; there are a great many kinds and colours of them; they are increaſed from off-ſets when their ſtalks are decayed. They love a light ſoil.

Lillies; Of theſe there are many kinds, double and ſingle, and of ſeveral colours, being much eſteemed for their ſmell; they riſe very tall, and adorn a garden very much; they flower in June or July, and are

propagated by parting their roots, about Auguſt or September. They love a light ground.

The Aſphodil bears ſtar-like flowers; there are ſeveral kinds of them, and different colours; they flower in May or June, and are propagated by off-ſets from the root; they may be likewiſe had from ſeed, but being of no great value or beauty, it is not practiſed. They love a good ſtrong ground, not too dry.

Spiderwort; There are ſeveral kinds and colours of it; the white being much eſteemed, riſeth up with a tall ſtalk, about twelve or fourteen inches high, with bell-flowers ſtanding out upon it: the white flowers in May, the blue in July and Auguſt; and are both propagated by the roots. They love likewiſe a good ſoil.

The Corn-flag is fit for wilderneſſes, or any outborders, becauſe it rambles up, and diſturbs other flowers with its broad long ſtiff green leaves, full of ribs, the ſtalk riſing from among them about three foot high, bearing many flowers one above another, ſtanding all one way like the Fox-glove; it flowers in June. There are ſome ſorts of thoſe plants which have flowers upon all ſides of their ſtalks, ſuch as the white and ſome others. It is propagated by off-ſets from the root. It grows in very indifferent ground.

Roſe-campion has a double and ſingle kind, and is very well known in this country; for there are many of the ſingle grows wild: it riſeth very high, and bears a great many flowers on a ſtalk; it flowers in May and June, and continues till September. It alſo will grow in indifferent ground.

Dame's-violet, or Queen's-july-flower; There are ſeveral ſorts of them, three whereof are common, the double white, purple, and ſingle purple; there is another which is rare, and is moſt eſteemed, the double ſtript one, which flowers in May or June. The ſingle ſtript one is much reſpected for its bearing ſeed,

which

which when ſown produces varieties. They love a good warm ground.

Sweet-william; There are two ſorts with ſingle flowers, and a double kind cultivated in gardens; the ſingle ones differ only in the colour of their flowers; the one has bloſſoms variegated with red and white, and the other cluſters of flowers on the top, of a deep crimſon colour: they flower in July and Auguſt; the double ones are propagated from ſlips taken from the root about March or April; and there is lately raiſed a double variegated ſort; but the ſingle ones may be raiſed from ſeeds ſown in March, from which come the different colours. They delight in light ground.

Venus Looking-glaſs is a pretty ſeedling; it adorneth a garden, and is proper for edgings, or to be ſown in ſpots; its branches run very low; and have ſmall leaves nicked on the edges: it bloſſoms in July or Auguſt, bearing flowers of a purple colour. It may be be ſown in March on a warm ground.

The Red-ſattin flower, called the French Honeyſuckle, hath many ſtalks ſet with winged green leaves; at the joints cometh out ſmaller ſtalks, ſet with many flowers of a red colour. There is another which is white, but is not ſo common; it bloſſoms about a foot high in June and July, and makes a very good ſhow. It is propagated by ſeeds ſown in March or April, on light ground expoſed to the ſun; the ſeedling plants will not bloſſom for two or three years. It is a hardy plant, and will live ſeveral years.

Double and ſingle Poppies are common; their colours are various, and their flowers very beautiful, but not laſting; they appear in May and June; after once ſowing, pull up the worſt and let the beſt ſhake; you can never loſe the kind. They will grow almoſt any where.

Baſtard Dittany is of two colours, red and white, and grows about two foot high, with divers browniſh ſtalks, the lower part ſet with many winged leaves, like thoſe of young Aſh, ſeven, nine or eleven together, curled about the edges; on the ſtalks grow many flowers one above another; each contains five long leaves: it blows in June and July. It is propagated by off-ſets, and loves a good warm ground.

The white Hellebore, being a curious plant, riſing very tall, is of two kinds, one with reddiſh black flowers, and the other with greeniſh flowers; they are admired for the beauty of their leaves; they bloſſom in May and June; the roots and ſtature of both kinds are much alike. They are propagated from off-ſets parted in March, and likewiſe may be propagated by the ſeed; but it ripens ſo ill, that it is hardly worth pains. They love a good warm ground.

Red Virgin's-bower is a climbing tree; there are two plants of this kind, the ſingle and double, of red and purple colours; they have many weak woody branches, covered with a thin outer bark, and green underneath, winding about any thing it can take hold of; the leaves ſtand at the joints: they flower the latter end of May, and theſe begin to appear from the joints on long foot ſtalks, made of four leaves ſtanding like a croſs, and continue till froſt. It is increaſed by layers.

The Corn-flower has may kinds: but there is a double red one which is reckoned the fineſt, and is not eaſy to be raiſed. They are ſown in March, and require a good warm ground.

The Spaniſh Scabious is of ſeveral colours, but has little ſmell, yet it bears pretty flowers almoſt all the ſummer long. The ſeed muſt be gathered from the beſt flowers, and ſown in March: in dry weather it

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muſt be watered. It ſometimes lives through the winter, if not too ſevere.

Violets are eſteemed for their fine ſmell; there are ſingle and double ſorts of them; the common ones are the blue and white; the rare ones are the double blue, the double white, and that with variegated leaves: they flower in March and September. They love lean ground, and ought to be planted with Primroſes and Cowſlips under hedges.

The Heart's-eaſe is a ſort of Violet, yet ſomewhat bigger, and bloweth all the ſummer, and alſo in open weather in the winter; it ſhaketh its ſeed in the ground, and ſo cometh up next ſeaſon. It may alſo be increaſed by ſhoots. It loveth a good ground.

Larks-heel, being an annual, is very pleaſant in a garden; they are ſown every year to get double ones, but letting them ſtand they will ſhake themſelves, and come up the next ſeaſon; it blows with ſeveral colours, upon ſtems of three foot high, from June till Auguſt or September.

Columbines; There are alſo of theſe variety of beautiful colours, ſtript and unſtript; as alſo ſome like ſtars, which look very well in gardens. To have varieties of kinds and colours, take the ſeed of the fineſt and doubleſt kinds, and ſow it in March on light ground oppoſite to the ſun. You may alſo increaſe them by dividing the ſets, but they are beſt from the ſeed.

The African and French Mary-golds; They are ſown either in hot-beds, or warm ground, in March or April; they adorn a garden when ſet in flower-pots; the ſmell is not ſo very agreeable, but now there is to be ſold in the Seeds-mens ſhops, particularly in Mr. Patrick Drummond's Shop, Lawn-market, Edinburgh, the ſweet ſmelling French Mary-gold, which, when ſet in pots, ſcents a room very well; they require much

of

of the ſun to make the flower blow large; they blow about two foot high in May, June, July, Auguſt and September.

Meadow-ſaffron; Of this there is different kinds and colours; the leaves come up in the ſpring, being of a light green; about mid-ſummer they decay again, and about Auguſt and September the flower cometh up, when moſt other flowers are gone, and is very pretty in a garden, when ſet in rows or ſquares; they love a good light ground. They muſt be tranſplanted about mid-ſummer when the roots are entirely at reſt.

Sow-bread; There are many ſorts of this plant, and of different colours; they blow both in ſpring and autumn; the rarity of them in this country makes them the more valuable: the time of removing is in June or July, or before the time of their blowing. They are only propagated by ſeed, which muſt be ſown as ſoon as ripe in boxes, and then at two years end tranſplant them into the garden: Theſe plants are beautiful, as well in the variegations of their leaves as the delightful colour of their flowers. They love a good warm ground.

The Lilly of the Valley is very common in this country, and is in many gardens, the flower having a very pleaſant ſmell, much like unto the Orange-flowers; the uſe of this excellent flower in ſeveral preparations, and its ſpecific properties and virtues in ſome diſeaſes, makes it the more acceptable. It groweth in light ſandy ground.

Gentianella is a plant which groweth very low, yet is a great ornament to a garden; it bloſſoms open in April, and alſo frequently in November and December, if the weather be open. It bears blue flowers of a deep dye, and loves light ground, where it will put forth

forth many ſlips, which may be parted from the root in March or Auguſt.

Snap-dragon or Calve's-ſnout; Of this there is many different colours, which come from the ſeed ſown in March, and next ſummer it begins in May to blow, and continues all ſummer.

The Bee-flower, of which there is a great many colours; they muſt be taken up when the ſtem is dryed in autumn. They commonly grow in wet marſhy ground.

The Peonies, though a common flower, yet yields the faireſt and moſt durable bloſſom in May of any: But the white, purple and changeable Peonies, are acceptable in the gardens of the beſt floriſts, they being rare; and the ſingle Peonies in the Phyſic-garden for the ſpecifical virtues of their roots. October is the beſt time to remove them.

The flower Conſtantinople; There is two kinds of it, the red and white; they riſe with a tall ſtem two or three foot high, with long green leaves on the ſtalk, with a buſh of flowers on the top; they flower in July and Auguſt, and delight in light ground.

The Daiſy is one of the ſmalleſt plants that grows, its flowers blowing about four or five inches from the ground. The ſorts commonly known and cultivated in gardens are, the double red, the double white, the double red and white, the Coxcomb or Rainbow-daiſy, and the Hen and Chicken-daiſy; the laſt of theſe has little ſtalks of flowers growing out of the main bloſſoms. Theſe plants are increaſed by parting their roots, either in the ſpring or autumn ſeaſons, and love a binding ſoil. They make pretty edgings for flower-beds; but part their roots every ſpring-ſeaſon, otherwiſe they decay and degenerate.

Carnation or July-flower, is of all others the moſt delightful, as well for its pleaſant ſcent, as for its beautiful

beautiful colours; the varieties of it are hardly to be numbered, every year producing new ſorts of it. It is divided into five claſſes, and diſtinguiſhed by theſe names, Picketees, Painted-ladies, Beazarts, Flakes and Flames: the flowers of the Picketees are always of a white ground, ſpotted with red or purple: the Painted-ladies have their petals tinged on the upper-ſide, either with red or purple, and the under-ſide of their flower-leaves is plain white; the flowers of the Beazarts are ſtript, or variegated with four diſtinct colours; the Flakes are of two colours only, and thoſe always ſtript; and the Flames have a red ground, always ſtript with black or very dark colours. Each of theſe tribes are very numerous, and the time of their flowering is uncertain; for theſe put into the ground about March, will blow ſooner than thoſe ſown in May; however the height of their bloom is about the middle of July. Theſe flowers are propagated by Seed, Cutters and Layers; we have the different kinds from the ſeed ſown in March or April, according to the ſeaſon; Layers muſt be laid in June, and muſt be kept moiſt. Cuttings muſt be taken off, and planted together in a bed in Auguſt, and let ſtand till May, and then tranſplant them.

The Pinks moſt commonly cultivated in gardens, are, the Red Double-pink, the White Double-pink, the Double pheaſant-Eye Pink, the Dwarf Double Mountain-pink, the China-pink, Dobſon's-pink, and ſome others, beſides the common ſingle ones raiſed from ſeed ſown in Drills or Lines about March. The firſt three of theſe blow about a foot and a half high. The Dwarf Mountain-pink is a ſlow grower, and is ſeldom above eight inches high. Theſe four kinds of Pinks are all raiſed from Slips planted in Auguſt, or very early in the Spring. The China-pink is very curious for it ſtrange variety of odd colours, and its

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ſtrange variegations in the middle of its flowers; it is raiſed from ſeeds ſown in March, and bloſſoms the firſt year about a foot high: but if you cut off its bloſſoms when they appear, and ſuffer it to flower no ſooner than the ſecond year, your ſucceſs will be better by this management.

Of the Roſe-tree and its kinds, there is more variety propagated than of any other flowering-tree or ſhrub; the flowers are moſt pleaſant and delightful for their agreeable ſmell and beauty; one or other of them will bloſſom for nine months of the year; they are diſtinguiſhed by the following names, firſt, the Cinamon-roſe, which is the moſt forward blower; the Monthly-roſe, and the Cluſter Monthly-roſe, which, if planted againſt a warm wall, will begin to blow in March or April, and will continue to produce flowers for near three months; and after they are out of flower, if they have the tops of their branches prun'd off, you may expect a ſecond crop of roſes from the ſame tree in Autumn, which will continue their bloſſom till near Chriſtmas, if the weather be open; the Damaſk-roſe, which begins its bloſſom in May, and continues flowering for above ſix weeks; the Roſamundi-vermilion, with the white, red and yellow roſes, begin their bloſſoms ſomewhat later than the Damaſk; and laſt of all, the Cent-ifoli, or Province-roſe, ſhews its ſurpriſing flowers. But beſides theſe ſorts there are many others; and altho' the ſeveral ſorts of Roſes differ in their times of flowering, yet they are all propagated after the ſame manner; they love a ſtrong ground, and delight ſo much in moiſt places, that they will grow in water; they may either be raiſed from layers or ſuckers: the firſt may be laid down in September or October, and the ſuckers may be taken from the old roots in the ſame months, or about March, and tranſplanted immediately

ately, before their roots, which have but few fibres, grow dry: but if neceſſity obliges to keep them out of the ground for ſome time, lay their roots in water for five ot ſix hours before planting.

The Guilder-roſe bears its bunches of white bloſſoms very large in May; this plant ſeldom riſes very high; it delights in a ſtrong ground, and may be raiſed from ſuckers taken from about the old root, either in March or September.

Of Jeſſamine there are three kinds which bear froſts, known by the common names of White-jeſſamine, Yellow-jeſſamine, and Perſian-jeſſamine. The firſt of theſe is capable of reſiſting the moſt ſevere weather; it is generous in its growth, ſhooting ſometimes more than ſix foot in a ſummer, and produceth its white fragrant flowers about June, and continues bloſſoming till September. It is propagated by layers or cuttings, and will grow in any ſoil. The time of laying the young ſhoots of this plant into the earth is about September, and at that time cuttings may likeways be planted about a foot long, taking care that the knots be under ground. The Yellow-jeſſamine has its leaves more ſhining than the former, and its flowers not much unlike the Yellow Indian-jeſſamine, and is propagated the ſame way as the other. The Perſian-jeſſamine bears flowers of a purple colour, but ſeldom makes a large plant; it is raiſed from layers or ſuckers, and loves a light ſoil.

Honey-ſuckle; there are ſeveral kinds of it, which are diſtinguiſhed by the names of the Forward-blowers, Latter-blowers, Scarlet-flowered, and Ever-green Honey-ſuckle: theſe are all twining plants, and are raiſed from ſeed, layers or cuttings, ordered like thoſe of the Jeſſamine in September or October; they love a ſhade, and are quick growers, ſome one or other of them flowering the whole Summer.

The

The Lilac; there are three ſorts of it, the Blue, Purple and White. It is a plant which grows to a pretty large tree, bearing its bunches of blue, or rather purple flowers in May. They may be raiſed by laying down the young branches in March, or by taking off the ſuckers, and planting them in a light ſoil in the ſame month, or in September.

The Syringa has two qualities, *viz.* that the leaves taſte like green Cucumbers, and the bloſſoms ſmell like Orange-flowers. This ſhrub is propagated by ſuckers taken off in March or September, and puts forth its fragrant white flowers in May, and continues blowing for ſix weeks; it will grow any where, and, if planted in a ſhady place, will ſhoot vigorouſly.

The Mezereon; there are three ſorts of it, the red, white, and purple flowering ſorts; the firſt is common enough, but that with the white flower is rare; they are all of them dwarfs, ſeldom riſing higher than three feet. They flower in January, and have a pleaſant ſmell; they continue a long while in bloſſom, and are propagated by ſeed ſown in March, or layers. They love a loamy ſoil.

The Senna; there are ſeveral kinds of it, but of theſe there are only two ſorts which are commonly known and made uſe of, *viz.* the Scorpion-ſenna, and the Bladder-ſenna. The firſt is the moſt beautiful, the bloſſoms ſhewing themſelves as well in Autumn as the Spring. They are propagated either by ſeed ſown in the end of March, or by laying down the tender twigs in the earth in April or May, which ſoon take root, and may be tranſplanted without difficulty. They love a loamy earth, and grow well in a ſhade.

The Juniper; there are two kinds of it, the Common, and that which is called the Sweddiſh-juniper; both of them reſiſt the moſt ſevere froſts. The ſmall-

neſs of their leaves is ſuch, that an ingenious workman may train them up in any ſhape, and by often cutting them, they will be ſo cloſe, that no other plant can exceed them in that reſpect. It delights in a barren ſoil, ſuch as hills or muirs, where the common kind grows very plentifully. The berries may be ſown about March, in a light ground, without watering them, or giving them any rich manure: They come up in two months after ſowing, and may remain two years in the ſeed-bed before they are tranſplanted, taking great care to keep them free from weeds.

The Piracantha has many perfections which are not found in other Ever-greens, beſides the beauty of its leaves; the bunches of white leaves which it produces in May are very ornamental, and its coral-like beads, which hang upon it all the winter, afford us a moſt delightful proſpect: to theſe perfections the ſtrength of its thorns may be added, which makes it one of the moſt uſeful plants for hedges. It may be trained into balls or pyramids, which will be almoſt covered with ſcarlet berries, when nature ſeems to reſt in other things. It may be raiſed either from the berries, or from layers or cuttings. The berries of this plant, when they are ripe, ſhould be gathered, and after being laid to ſweat for ſome time, may be put in ſand or earth till the Autumn following, then they may be ſown in the nurſery-beds. They will ly a long time in the ground before they begin to ſpring, as the Hollies: but Mr. Bradly, in his New Improvement, &c. for gaining a year's growth of them, adviſeth, 'To take a buſhel of bran, and after having mixt 'the ſeeds or berries with it, wet the whole very well 'with rain or pond-water, and let the preparation 'remain for ten days, without any diſturbance, in a 'veſſel of wood or ſtone. About three days after

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'the mixture has been prepared, it will begin to heat, 'and ſo continue to ferment for thirty or forty days, 'if it be carefully ſprinkled from time to time with 'warm water as it begins to dry. The heat of this 'wet bran will prepare the berries mixt with it, and 'put them into a vegetable poſture, in about a week's 'time after the ferment has begun, and then they may 'be ſown in nurſery.' They are very difficult to tranſplant, having five fibres at their roots; therefore, when they are come up, and have ſtood a year or two at moſt, they ſhould be planted out where they are to remain. In the removal of this, and other trees of the like nature, you muſt be careful to keep the roots from drying before they are put again into the ground. To raiſe theſe plants from layers, lay down only ſuch branches as are tender, and of the laſt ſhoot; which rule muſt be obſerved in the laying of all Ever-greens. About May or June, cuttings of the freſh tender twigs may be planted in pots of earth, watering them frequently, and keeping them from the ſun till the following winter, at which time warmneſs will be helpful to them, and prepare them to make a ſtrong ſhoot in the Spring. Plants raiſed in this manner may be tranſplanted with greater eaſe and leſs hazard than thoſe raiſed from the ſeeds, or by layers. The Piracantha delights in a dry gravelly ſoil, and will grow to be a large tree if rightly managed, and kept from dung or other rich manure, which will deſtroy it.

The Strawberry-tree, altho' an exotick plant, thrives very well in our climate; it is a moſt beautiful tree, bloſſoming twice a year, and has its fruit ripe in the winter. It is very ſcarce here, but grows plentifully in Ireland. This plant is not ſo well diſpoſed to be trained up into nice ſhap'd trees, as many others, but it makes a pretty hedge, and is very ornamental in wilderneſs

wilderneſs walks. It loves a light gravelly ſoil, and may be raiſed either from ſeeds or layers. The fruit muſt be gathered about Chriſtmas, and laid to dry for a month, and then bruiſed and mixt with ſand, to be ſown in pots of light earth, and covered about a quarter of an inch with ſifted mould. This work muſt be done in March. The heat of a hot-bed will much help the generation of the ſeeds, which ſhould be frequently watered with pond or rain-water till they come up. The moſt tender ſhoots of this tree may be laid down about September in fine earth, and will take root in a year's time, if they are kept moiſt by frequent watering; but will not be ſtrong enough to tranſplant till the ſpring following.

FINIS.

THE

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By *ROBERT MAXWELL*, Gent.

The SECOND EDITION.

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A TREATISE

UNTO THE RIGHT HONOURABLE,

JOHN Earl of STAIR,

Viſcount DALRYMPLE, Lord *Newliſton*, *Glenluce* and *Stranraer*; Field-Marſhal of His Majeſty's Forces, General of Marines, Governor of the Iſland of *Minorca*, Colonel of His Majeſty's Royal Regiment of *North Britiſh* Dragoons, one of His Majeſty's moſt Honourable Privy Council, and Knight of the moſt ancient *Order of the* THISTLE, *&c. &c.*

My LORD,

IF none excepted againſt Books, but ſuch as could amend them, ſuch Cenſure would be commendable; but many cavil only to gratify their captious Humours; hence it is, that Writers dedicate their Books to the Great for Protection,

tection, and that the Rays of their Patron's Glory may communicate Light to their Labours; ſo I moſt humbly addreſs You, my Lord, YOU who have gained *Great Britain* as much Honour by your wiſe Negotiations, as any Ambaſſador ever did before, or has done ſince you were ſo employed; YOU who have evidenced that You are both a conſummate Stateſman and General, equally well qualified for the Council and Camp; YOU whoſe Name and Memory will be ſacred in all future Records, for Valour, Wiſdom and Succeſs: But, which is ſtill more Honourable, if any Thing can be more Honourable than theſe; upon YOU, who have proved, that You're a Lover of Husbandry, and a Notable Husband-Man, which makes YOU the more natural Patron of this my Treatiſe.

THE Policy of States is generally to enlarge their Territories; Wars are always attended with the Deſtruction of Numbers of People, and many other Calamities; but Improvements in Husbandry are more profitable for *Great Britain* than Conqueſts. Husbandry is the Life and Support of the whole People, from the King to the Beggar. *The Profit of the Earth is for all, the King himſelf is ſerved by the Field:* Husbandry is alſo the Life and Support of all Arts and Sciences: Our Manufactures and Trade depend upon it, and ſubſiſt by it; They can only flouriſh in Proportion as it ſucceeds: It furniſhes the Materials for both: It is the Stock, and they are only the Improve-

ments

ments of it. The Practice of it procures a robuſt Conſtitution of Body, which enables Men to perform great Actions; it encreaſes the Strength of the Labourers, and renders thoſe who work at the Plough, robuſt and hardy, by inuring them to the Inclemencies of the Seaſons, the Colds of Winter, and the Heats of Summer, and by obliging them to riſe early, and to keep themſelves always employed.

If at any Time our Country ſhould be invaded, they, more than other Men, are excited to defend it: For, when other Things may be hid, their Corn and their Cattle muſt remain expoſed in the Fields, to be carried off, or deſtroyed by the Invaders; and as they will be more forward, they will alſo be more able, than any other Set of Men, to do it, and, by their own Strength and Courage, to take Revenge: So Husbandry ought to be held in great Eſteem by all Governments: It furniſhes them with the beſt Subjects, and ſuch as are moſt ſtudious of the publick Good; for which Reaſons there is no Art, no Science, ſo honourable, ſo uſeful as Husbandry.

YOUR Lordſhip has indeed learned the Principles of it, by the ſuperior Strength of Your own Underſtanding, tho' You could find no Univerſity in which it is taught; but ſurely 'tis for Want of Teachers, that the Generality of Farmers are ſo ſhamefully, ſo miſerably Ignorant of this their Buſineſs, the chief of all earthly Concerns. May we not therefore complain with *Columella*, and o-

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thers ſince, that all other Arts and Sciences, even ſuch Vanities as Dancing, have publick Schools and Maſters, and yet that we ſhould have no Profeſſor of ſo Pleaſant, ſo Virtuous, ſo Honourable, and ſo Neceſſary an Art as Agriculture. He cried out, 'O Husbandry, thou that art ſo nearly related to 'Wiſdom, thou alone has neither Maſters nor Scholars!' May not we do ſo too, ſince the Caſe in his Time and ours is the ſame? How then could a great Man do a greater publick Good, or add any greater Glory to his Character, than by promoting the Eſtabliſhment of an Univerſity of Husbandry, or of a general Director, or Directors of Agriculture?

YOUR Lordſhip's Knowledge is not loſt, but highly uſeful to Society. You teach us daily by Your Noble Example, and, beſides what otherways drops from Your Bountiful Hand, You relieve the Poor by employing them at your Works. If every great Man beſtowed his Money as You do, the giving them Places with great Sums would be a publick Advantage, and the more they got, if it was not highly exceſſive, the Kingdom would be the more benefited.

TO particularize only your Husbandry Works, by which You have taught us, and are ſtill teaching us, better Methods than we know, or knew before, even thoſe hinted at in my DEDICATION of the ſelect Tranſactions of the Society of Improvers, would ſwell this Letter to an uncommon Length, wherefore I will endeavour to hold my Hand, tho'

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the Force of Truth and Juſtice to Your Lordſhip's Merit are puſhing me on.

I have tried to reſtrain myſelf, but I find I cannot, until I obſerve from what I have ſaid, that You are ſurely a moſt happy Man, my Lord, for You have won the Bleſſings of the Poor, have commanded the Eſteem of all Ranks, and have even laid the whole Kingdom under a Load of Obligations to You, by Your glorious Conduct on all Occaſions. When Men have a Mind to glory, why do they not ſeek it in applying their Minds, as your Lordſhip has done, to do good?

IT is impoſſible, my Lord, I can have given Cauſe to accuſe me of Flattery, all I have ſaid being ſtrictly true. On the contrary, I ought to have ſaid more, ſince I adventured to ſay any Thing; for who won't ſee, that I leave untouched the moſt ſhining Parts of Your Character; PARTS for which every *Briton*, who loves his Country, will in Ages to come, pay Honour to Your Memory. As an Apology for this Neglect, I plead, firſt, my Fear of offending Your Modeſty; next, my Inability to deſcribe them properly. If I touched them, my Fingers might ſully their Luſtre, for he who praiſes amiſs, leſſens whom he would commend: Leſt I ſhould fall under that Cenſure, I am obliged to draw a Veil over what I have deſpaired of being able to repreſent. But,

UPON

UPON the whole of Your Conduct, without going further into Particulars, I muſt ſtill obſerve, that it is by all acknowledged, that you have walked ſteadily in the Paths of Virtue, the cardinal Virtues, thro' all the Stages of Your Life, wherefore we honour and eſteem You as much as we can. I beg Your Patronage, and pardon for preſuming to take this publick Occaſion to ſubſcribe myſelf,

MY LORD,

Your Lordſhip's,

Moſt obedient,

And moſt humble Servant,

ROB. MAXWELL.

TO THE READER.

THO' I intended, by the Introduction, to have ſaved you the Trouble of a Preface; yet, I think, it may not be improper to offer you this. Pray, allow me to ſhew you a Reaſon, why a Book deſerving the Title of, The PRACTICAL BEE-MASTER, *was exceedingly wanted; for to palm uſeleſs Books upon the Publick, is a Crime of a very heinous Nature, a Robbery of every Purchaſer. The Reaſon is ſhort. There was no Book, that I could ſee or hear of which deſerves the Name; none of them directing the Huſbandry of Bees, in many difficult Caſes which often occur.*

To help me to make this appear, I ſhall uſe the Words of the Author of the Natural Hiſtory of Bees. *Surely he ought not to complain, that I take from him, and uſe his Words, ſince he ſays,* "*I have* "*taken* ALL *the Materials from M.* De Reaumur," *the Author of Nature diſplayed; and adds,* "*I* "*have preſerved as far as poſſible his Terms and* "*Expreſſions.*

"The practical Reaſons, *ſays he,* for the Suc-"ceſs of Bees are nothing more than the Know-"ledge of their Wants; and theſe Wants cannot "be known, if one is not acquainted, with the ut-"moſt Exactneſs, of their Method of living, their "Temperature, their Nouriſhment, the Dangers to "which they are expoſed, the moſt favourable Si-"tuation they can be placed in; if one knows not "how to make them change their Habitation, *&c.*

"The Ancients have loaded their Hiſtory of Bees "with ſo many Fables and Abſurdities, that it is "not at all ſtrange, if the Prejudices, which ariſe "from theſe falſe Repreſentations, have retarded "the Progreſs, which might otherwiſe have been "made, on the training up of Bees.

"To inforce this profitable Art, and to render "it capable of the higheſt Perfection; it was ne-"ceſſary, that ſomebody ſhould give himſelf the "Trouble, to make Bees his Study more than the "Ancients had done. This has been effected in "our Time; and we are indebted to three cele-"brated Authors. *Swammerdam* is the firſt, who "applied himſelf, with all that Knowledge, of "which ſo great an Anatomiſt was capable. But his "Studies and Diſcoveries go not far beyond the in-"terior and exterior Parts of theſe Animals; their "Generation and their Food. His Deſign not ex-"tending to what might be uſeful either to preſerve "or multiply them. In ſhort, his Work, wrote "in *Latin* and *Dutch*, is of no Service to the "Perſons we have in View. The late M. *Ma-"raldy*, like the Gods of the Poets, who ſome-"times quit Heaven to amuſe themſelves with ter-"reſtrial Creatures; M. *Maraldy*, I ſay, diverted "himſelf, amidſt his Aſtronomical Obſervations, "with the Study of Bees. This Author has left "us a very minute Hiſtory of Bees, accompanied "with many Obſervations and Diſcoveries. It is "to be found in the Memoirs of the Academy, "and conſequently beyond the Capacity of thoſe "Perſons, who have the moſt need of it. Be-"ſides, this Author, as well as *Swammerdam*, "gives no Rules for the training up of Bees. "They are both ſatisfied to examine them as Na-"turaliſts. At length M. *De Reaumur* uniting

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" the Diſcoveries of all his Predeceſſors to his own, " has lately obliged us with a new Hiſtory of theſe " Animals; which one may conſider as the moſt " compleat and perfect Work, in all Reſpects, " that can be hoped for of this Kind; as well with " regard to the *Natural Hiſtory of Bees*, as to the " new and eaſy Methods, there propoſed, for " their Increaſe and Improvement. This Tract " is found in the 5th Volume of his *Memoirs in-* " *tended for the Hiſtory of Inſects*; a Work, " which for the Price, Bulk, and extenſive Learn- " ing, ſeems only fitted to the Capacities of the " Learned and Curious.

" Thus the Deſtiny of Bees has this in particu- " lar, that all thoſe, who have moſt ſucceſsfully " intereſted themſelves for them, who have beſt " known them, and who have treated of them the " moſt learnedly, and with the greateſt Exactneſs, " have not wrote but for ſuch, who have it not in " their Power to profit by their Diſcoveries, and " Lectures, and have no real Relation to Bees: " Whilſt thoſe who breed them, and who might " make their Advantage of them by enlarging " Commerce, have ſcarce any Knowledge of " them.

" This Reflection has given me the Notion of " making thoſe Diſcoveries and Improvements " more general, which ſeem locked up in the Ca- " binets of the Learned; and to place before the " Eyes of all thoſe who have any Deſire, or any " Intereſt to be acquainted with them, the moſt " proper Means to bring up theſe Animals, and " to enlarge the Commerce of Wax.

" 'Tis with this View, and for theſe Perſons " only, that I have attempted this Hiſtory of " Bees, I have taken all the Materials from the

" Memoirs

" Memoirs of M. *De Reaumur*. One will be ea-
" ſily perſwaded, that I could not draw from a
" purer, or a more copious Source.

" As my only Aim was to make myſelf uſeful,
" I have made no Scruple to make uſe of the Ob-
" ſervations, Remarks, Experiments and Diſco-
" veries, which have already been made upon Bees
" by others; and have likewiſe employed their
" Deſcriptions, ſuch as I found them, either entire
" or abridged, and ſometimes by enlarging them,
" when I was certain of not exceeding the Bounds
" of Truth. To what M. *De Reaumur* has ſaid,
" in his Memoir concerning Bees, I have added
" every Thing which had Relation to that Subject,
" which is found in his other Memoirs. I have pre-
" ſerved, as far as poſſible, his Terms and Expreſ-
" ſions, being perſwaded, that when Things are
" well expreſſed, an attempt to expreſs them o-
" therwiſe, is almoſt an inevitable Riſk to expreſs
" them ill. If my Conduct, in this Particular,
" had need of an Example to authorize it, I could
" cite that of M. *Rollin* in his ancient *Greek* and
" *Roman* Hiſtory."

You ſee the Author of the Natural Hiſtory *has told us, that the Ancients had loaded their Hiſtory of Bees with many Fables, Abſurdities, and falſe Repreſentations, and that no* French *Author, not even M.* De Reaumur *in his Hiſtory of theſe Animals,* "Tho' he had united all the Diſcoveries of his
" Predeceſſors to his own, had wrote but for ſuch,
" who have it not in their Power to profit by
" their Diſcoveries and Lectures, and have no
" real Relation to Bees, whilſt thoſe who breed
" them, and might make their Advantage of them
" by enlarging Commerce, have ſcarce any Know-
" ledge of them." *Now,*

How

How could this Author of the Natural Hiſtory, *make his Book more uſeful than M.* De Reaumur's *ſince he has acknowledged, that he took* "All the Ma- "terials from his Memoirs;" *and ſince you obſerve, that he does not ſo much as pretend, that he himſelf has made the leaſt Diſcovery?*

I will add, that he has neglected to direct the Bee-Farmer, how to conduct himſelf in Multitudes of difficult Caſes, which often occur, and ſtuffed his Book with extraneous and extravagant Matters, as thoſe who read my Book, and particularly the Appendix, will, I believe, be fully ſatisfied.

Where, then, was a Book to be found, that could direct the Bee-Farmer on many probable Occurrences? Not in France; *and, I believe, I may paſs over all that has been wrote upon the Subject in* England, *except Dr.* WARDER's *Book. In my Opinion it was the moſt uſeful of any; and yet, as I have obſerved while treating the Subject, and will be farther obſerved, by ſuch as have read his Book, and ſhall read mine; his is in many Caſes deficient, and in ſome erroneous.*

If the Matter ſtood thus; if there was no Book, to direct the Bee-Farmer in a great many difficult Caſes, which often occur, and in which, I hope, I have now taught him, how to conduct the Huſbandry properly; and, if I have, more fully than any other, "Placed before the Eyes of all thoſe, who have "any Deſire or Intereſt, to be acquainted with "Bees, the moſt proper Means to bring up theſe "Animals, and to enlarge the Commerce of Wax," *as the Author of the* Natural Hiſtory *has ſaid, but, I humbly think, has not ſupported or made out; Then, may not I, without Arrogance, plead that I had a Right to give the Title of The* PRACTICAL BEE-MASTER *to my little Book.*

If

If any Body ſhall be of Opinion, that I have here, or any where, ſpoke more favourably of my Performance, than Modeſty allows, I beg Leave to put him in Mind that Plutarch, *having wrote a whole Chapter of his Morals, upon the Queſtion,* "How a Man may inoffenſively praiſe himſelf "without being liable to Envy?" *In diſcuſſing of it, ſays,* "Yet, however, there is a Time when "a generous and prudent Man may be the Subject "of his own Diſcourſe, and give a free Relation "of Things he has worthily done or ſaid, as well "as other Truths." *This Time is the more proper for me to make theſe Obſervations, that ſome of the Sheets having been ſeen before the reſt were printed, a frivolous and uſeleſs Exception has, already, been publickly made againſt my Book: What it was, and the Remarks I have made upon it, you will find in the Appendix, to which that Exception gave Occaſion.*

I conclude with an Acknowledgment, that two or three Gentlemen, whoſe Names, if I had Allowance, I would mention, aſſiſted when I reviſed my Manuſcript. I have gathered from the Living and from the Dead, as all Writers, whatever ſome may pretend, have done, or ſhould have done; and, like the Bees I have treated of, I have ſucked, for you, from every Flower, I thought for my Purpoſe. In particular, I have been aſſiſted by a ſmall Manuſcript, which was put into my Hand by the ingenious Mr. Hope *of* Rankeiler, *and by another Copy of the ſame Treatiſe, with ſome few Additions, from another Perſon. Since I have taken the Freedom to mention Mr.* Hope, *I cannot in Juſtice omit to ſay, that his Name ſhould be tranſmitted to Poſterity, for the Love he has ſhewn to his Country, by greatly promoting Improvements in Huſbandry*

and

and Manufactures. You see I am far from alledging all is new, or all is my own, yet I only do myself Justice in saying, that I have been attentive, laborious, and made all the Discoveries I could, and no doubt, but, being little more than a Beginner at the Writing Business, I have as a Poet says, been obliged to

Blot out, correct, insert, refine,
Enlarge, diminish, interline.

But I think all my Pains well bestowed, since now I can promise you, that you'll find in this Book, tho' small, many necessary Directions, which I do not remember to have seen in any other.

BOOKS

BOOKS Sold by JAMES REID Bookſeller, on the *New-Key*, *Leith*.

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By JOHN REID. 2 *s*. 6 *d*.

THE

THE PRACTICAL BEE-MASTER, &c.

HUSBANDRY consists of many Parts, the more profitable the more they are conjoined, the more they are made to assist one another: All of them require Knowledge and Care in the Management, but some of them more Labour and Expence than others, and some less; of the last Sort is the Husbandry of Bees: None of them can be so generally, and on so small a Stock, so profitably followed as this. For,

2. Every Man or Woman, who has only a House and a Yeard, and Money to buy one single Hive, who knows how to manage these laborious and profitable Creatures, and who will adhibite due Care, may, after a few Years, raise a considerable Sum yearly out of this very Article alone; and may, nevertheless, carry on other Business, without any considerable Interruption by the Bee Husbandry.

3. The History and Husbandry of Bees is one of the most curious and entertaining Subjects, and has employed the Pens of the ablest Writers in different Kingdoms and in different Ages; but had these Writers omitted many unnecessary Speculations, and only, less intent on Theory, offered more and better practical Rules for the Management of these highly beneficial Creatures in all probable Occurrences, it cannot be doubted, but that

the Bee-Husbandry would have been more general, and more profitable to thoſe who practiſe it; That Honey the *Sugar of the Ancients* would, ere now, have ſupplied many of our Uſes of Sugar; Mead, or *Britiſh* Canary, of *French* and *Spaniſh* Wines; and that we might have had ſufficient Quantities of Wax, not only for Home-conſumpt, but likewiſe for Export: To prevent theſe Inconveniencies on the one Hand, and to obtain thoſe Advantages on the other, is the Deſign of publiſhing this Treatiſe.

4. Bees are of three diſtinct Species or Kinds. The *Sovereign-Bee*, the *Working-Bees*, and *Drones*: Of *Sovereigns* there is only one permitted to remain in every Hive, except young ones, until Swarming, for Sovereigns to other Hives; on this Sovereign the Good of the whole Family or Society depends, for, if removed, or killed, the whole Hive goes to Ruin: Tho' 'tis a Matter of ſmall, if any Conſequence, whether this Sovereign is Male or Female, *King*, or *Queen*, yet as poſſibly it may divert my Reader, I ſhall give my Sentiments about it, and my Reaſons.

5. Dr. WARDER pretends to have diſſected *Bees*, and, by the Help of his Glaſſes, to have diſcovered their Organs of Generation, whereby he ſays, he found the Sovereign Bee to be a Female, all the *Working-Bees* to be her Female Subjects, and the *Drones* to be the Male Bees; and hence it is, that, according to his Notion, the Sovereign being a Female, and all the *Working-Bees* her Female Subjects, carrying Arms for the Defence of their *Queen*, and her Government, he calls it the *Amazonian* Government; the *Drones*, called by him the Males, having no Sting.

6. The Doctor found a Conveniency in maintaining that this Sovereign was a Female: He dedicated his Book to the Queen, and told Her, *The Queen-Bee governs with Clemency and Sweetneſs, ſo doth your Majeſty, ſhe is obeyed and defended, out of Choice and Inclination by her Subjects, ſo is your Majeſty, for all the thouſands of your* Brittannick Iſrael *Eſteem your Majeſty's Perſon as ſacred,*

ſacred, and ſcarce ſuch a Villain is among us, who would not loſe his Life in Defence of your Majeſty.: You ſee, he has made a proper Uſe of his *Queen-Bee*, and taken her Aſſiſtance to make out theſe fine Compliments.

7. The greateſt Part of the Writers on this Subject, having been of the Opinion, That the Sovereign was a Male, and that it is by Virtue of this King, that the Working-Bees, who are Females, are impregnate; the Doctor makes merry, and ſays, *'Tis too mean an Office for him to be the common Bull of the Herd.*

8. I won't poſitively contradict what the Doctor pretends to have ſeen, ſince I have not diſſected theſe Animals, as he has done; yet I cannot help being of the Opinion, That, as I have ſaid, was generally received before the Doctor wrote, until I ſee with my own Eyes, Cauſe for altering my Sentiments, or find the Reaſons I offer, againſt what he ſays, ſatisfyingly anſwered: They are,

9. 1*ſt*. Government by a King ſeems to be the moſt natural Kind of it.

10. 2*d*. This Bee by Bulk and Strength ſeems to be a Male, for every Body who has ſeen him engaged in Battle againſt ſtranger Bees, will have obſerved him kill a great many of them.

11. 3*d*. What the *Doctor* ridicules, ſeems to have more Weight than he is aware of, and perhaps is the principal Cauſe why they bear ſo true Allegiance to him, and hazard their Lives ſo freely in his Defence; for, in my Opinion, 'tis natural to think, that the Inſtinct thoſe Creatures are endowed with, of being ſolicitous to preſerve their Sovereign, more probably proceeds from his being the common Father, than becauſe he is the common Defender of the Society.

12. I ſuppoſe none will deny, but natural Children are more engaged in Affection to their Parents, than Political Children are to theirs, and it is, perhaps, becauſe this Sovereign is both Natural and Political Father, that their Love to him is ſo great.

13. If it be objected, that it is not eaſily to be imagined,

ed, how this Sovereign can be a Natural Father to ſo many. I anſwer, That any Body who has thought of the Propagation of Inſects, will not think this ſtrange: For Example, Let us but conſider the Silk-Worms, after they have taken on the Form of Butterflies, what a Multitude of Eggs will be laid in one Day by one Female, all impregnate by one Male; But,

14. *4th.* The *Doctor* by ſuppoſing the Drones to be Male, brings himſelf under this Inconveniency, of aſſerting that the Females are all impregnate, ſeven or eight Months before they lay their Eggs; for I believe, all know that the Drones do not ſurvive the Month of *Auguſt* or *September*.

15. *5th.* The *Doctor* ſays, when giving his Judgment about killing the Drones, That this is not to be done, till the Working-Bees begin to do it themſelves, and alledges, That you may as well kill all the Rams of your Flock, and look for Lambs from your Ewes, as you can expect that Hive of Bees to thrive next Summer, the Drones whereof you have killed this; but, I beg the *Doctor*'s Leave to tell my Readers, That a curious and ingenuous Bee-Maſter informs me, that, for a Trial of this, he has begun early in the Month of *June* to kill the Drones of an Hive, and has continued ſo to do, from Day to Day, until he could find no more to kill; and that he was very poſitive, that few, if any, eſcaped his Knife, and that yet, that Hive was as forward and thriving next Spring as any other, whence it may be concluded, that another Father, than the Drones, muſt be found out, for the next Year's Brood.

16. *6th.* The laſt Argument, which I advance to prove this Sovereign to be a Male, is, That when an Hive loſes this Bee, they never increaſe any more, but daily diminiſh till they dwindle to nothing. I know it will be objected, that this does not prove the Alledgeance, becauſe, according to Dr. WARDER, an Hive or Swarm of Bees, do nothing at all after they loſe, or are robbed of their Sovereign.

17. To which I anſwer, That the *Doctor* is there ſpeak-

ſpeaking of a new Hive, about which he has made very conſiderable Diſcoveries, as ſhall be taken Notice of afterwards, but an old Hive and a young one differ: Whatever Diſorder or Diſcontent an old Hive may ſhew, yet they do not take it ſo much to Heart as a new Swarm does, but will continue as long as they live, to carry in Honey to their Hives, tho' they never work upon their Thighs, knowing it is fruitleſs to make any Attempt for Propagation, when the common Parent is gone.

18. Thus I have known them all gradually die away, and yet leave a conſiderable Deal of Honey, which accounts for Bees their forſaking their Hives, without being any Way diſobliged, ſo far as can be underſtood, and yet leaving Plenty of Proviſion behind them, which frequently happens, ſo I muſt be allowed to call their Sovereign a King, until theſe Objections are anſwered.

19. But, if it be enquired what is the Uſe of theſe Drones, and how are they propagated? I anſwer, That, their Uſe ſeems to remain ſtill a Secret, but I make no Queſtion that they have Male and Female among themſelves: Nature has, no doubt, made them for ſome Uſe, and yet I could never find any Man who could ſatisfy me what it was: Some alledge that they aſſiſt in hatching the young ones, for being bulky, and ſometimes very numerous, their Warmth does not a little contribute to the cheriſhing of the Brood; but how anſwer they this Objection, *viz*, What Way is the Hatching of the Young performed in *April*, when the Weather is cold, many of the Bees dead in Winter, and not a Drone to be ſeen in the whole Hive?

20. I thought to have left this Argument, in my Opinion more amuſing than uſeful, with this further Obſervation on Dr. WARDER's Opinion, that even he himſelf, ſpeaking of the Drone, is obliged to confeſs, That it is only moſt probable, that he is of the Male Kind, and that his being ſubject to the other Bees, is an Argument againſt him: Now, if the Drone is not the Male-Bee, then there is none, according to his Doctrine; but the natural Hiſtory of Bees, as tranſlated from the *French*,

and

and the Female Monarchy by the Rev. Mr. *Thorley*, both publiſhed in the Year 1744, falling into my Hands; theſe I cannot paſs over without Remarks on what they ſay, concerning the Sex of Bees.

21. In the Natural Hiſtory mentioned, a Dialogue betwixt *Eugenio* and *Clariſſa*; *Eugenio*, ſays he, opened the Sovereign Bee anatomically, and aſſiſted *Clariſſa* by his Glaſs, to ſee that ſhe, the Sovereign Bee, is the fruitful Mother, that the Drones are the Males, and that the Working-Bees are of no Sex: Dr. WARDER ſays they are Females: What ſhall we believe?

22. The Clergyman gives us the Opinion of many Authors, as to the Sex of Bees, and their Manner of Procreation, and makes ſuch Obſervations on them ſeverally, as he thinks may beſt ſuit his Purpoſe; thereafter, *From the Premiſſes*, ſays he, *may we not juſtly draw this Concluſion, That the Drones are not the Males, neither have they any Inſtrumentality, or Agency in the Generation of Bees?* So far, you may remember, I agree with him, with Reſpect to the Production of the Working Bees, tho' I doubt not but that, as I have ſaid, there are both Male and Female Drones, and that they breed by Copulation with one another.

23. *If this Point*, ſays he, *is yielded to, then*, he ſays further, *I am moſt fully perſwaded that they do not breed by Copulation, the common Bees being neither Males nor Females, and the Sovereign being Female, and the only Female.*

24. I deſire you may remark what he comes to at laſt: *After all that has been offered on this Head*, ſays he, *it ſeems to be a mute Point that will admit of a further Diſpute; as I cannot attain to a full Satisfaction therein myſelf, How can I expect that my Arguments ſhould adminiſter the ſame to my Reader, whom I muſt leave to his own Judgment and Choice?*

25. Now, after ſuch a Conceſſion, What can we think he aimed at? Does the *Clergyman* doubt, that all living Creatures were created Male and Female? Does he doubt, that the Males and Females of all living Creatures

tures were preſerved in the Ark? If they were, I wiſh he had told us what has deſtroyed all the Male Bees ſince; but, ſtrange! Would he have us to believe, that a Female Bee can carry on the Work of Generation, any other Way, than by the Aſſiſtance and Co-operation of the Male.

26. I ſhall next give you a more particular, tho' ſhort, Deſcription of every particular Species of them, becauſe this Treatiſe may fall into Hands who have not, or want Money, to purchaſe Books, that deſcribe them.

27. The King is conſiderably larger than the Working-Bee, but ſmaller than the Drone; He's broad-ſhouldered, his Legs are ſomewhat red, and his Train is long and taper, which makes his Wings look ſomewhat ſhort in Proportion to his Body; His Sting is alſo ſhorter than that of the Working Bees, tho', as was hinted before, he knows well how to uſe it when Occaſion requires. In Concluſion, he has ſo much Majeſty about him, as plainly diſtinguiſhes him, at firſt View, from the reſt.

28. As to the Working Bees, they being ſo well known, I need ſay nothing about them; the Drone is as large as two of them, but very clumſy, and has no Sting; any Body may ſatisfy their Curioſity about the Drones, if in the Summer-time they go to an Hive, betwixt Eleven o' Clock in the Forenoon and Two in the Afternoon, then they will come abroad in great Numbers, and fly about, making a buzzing Noiſe; it is indeed very hard to get a View of the King, for there being but one in an Hive, and he coming ſeldom abroad, it is difficult to nick the Opportunity of ſeeing him, tho' it is no Rarity to get a Sight of him when dead; for if any will take the Pains to turn over the dead Bees, of an Hive that has been ſmoaked, they will ſcarce miſs to find him, or when two new Hives are put together, by turning the Mouth of the one upon the Mouth of the other, as ſhall be taught hereafter, you'll very often find a dead King lying in the Bottom of the empty one, but he's then ſeen greatly to the Diſadvantage, Death having

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ing disfigured him, yet his Corps may be eaſily diſtinguiſh'd.

29. Having ſo far ſatisfied my Readers Curioſity, I ſhall now proceed to inſtruct, how to manage every Step of this Husbandry, ſo as the neweſt Beginner may find both Profit and Pleaſure, in the Study of theſe wonderful Animals, and reap the Benefit of every Year's Labour: This is what I chiefly intended, tho' it will afterwards fall in my Way, to treat more fully of the curious and ſpeculative Part. But, as I think, others have made the Theory their principal Study, I reſolve to be the more practical; and, that I may avoid the common Error, as much as poſſible, I ſhall relate many Circumſtances, neglected by others, tho' abſolutely neceſſary to be conſidered, and ſhall give particular Directions concerning them.

30. He who intends to be a Bee-Maſter, ſhould buy a Top Swarm in the End of *Auguſt*, or Beginning of *September*, when they have given over Working: Here you muſt take Care to avoid the general Miſtake, which is, That the Hive, which is neither too light nor too heavy, is fitteſt for keeping. Theſe who are of this Opinion, maintain, that the Hive that has too much Honey over Year, is indifferent and lazy in the Spring, and does not ſet out to work briskly; and one, ſay they, that is too light, will, unleſs ſupplied, periſh in Winter for Want of Food.

31. This Aſſertion concerning the light Hive is certainly true, but the other is not ſo, for the more Honey an Hive has, if there are Bees in Proportion in it, the more briſk and forward will they be in the Spring, tho' one that was but of a moderate Weight may, in ſome Seaſons, do as well as one that was heavier; yet that rarely falls out; it much oftener happens, that the heavieſt of all will be pincht, and that thoſe that were thought heavy enough muſt be fed, or die.

32. The Reason why a lighter Hive does ſometimes as well as a heavier one, is, if the Spring is good and early, and a continued Tract of good Weather follows, then

then the Hive, that had only a ſhort Allowance, does not come to know what Famine is; but a greater Paradox than this is, the Lighteſt ſometimes outſtrips the Heavier, and comes to good Account, when the other dies for want of Food; but this falls out rarely.

33. The Caſe in which it happens, is; when the Weather begins to be tolerably good, in the End of *March* and Beginning of *April*, then the ſtrong lively Hives ſet out to work, and immediately begin to hatch a new Brood, which, toward the End of *April*, come to require a great Deal of Food, ſo the Remains of the Winter Proviſion muſt go for their Maintainance; and then if the Weather is ſo bad in *May*, that the Bees cannot go abroad for a Recruit, their Proviſion falls ſhort, their Family being ſo numerous, ſo unleſs they be taken Notice of, and fed, they muſt die, while the Weaker and leſs forward Hives are living moderately, with a ſmall Family upon their Winter Stock; but, as I ſaid before, this rarely happens, ſo it ought not to be eſtabliſhed into a Rule, and therefore from what is ſaid, I think, 'tis plain, that the heavieſt Hive is the fitteſt for keeping, tho' Dr. WARDER be of another Opinion.

34. That you may know, when an Hive is heavy enough for keeping, or whether the heavieſt you can find be ſufficient, take the following Directions.

35. A Top Swarm, in one of the ordinary Sort of the Bee-hives uſed in this Country, which will hold about one Peck, three Lippies of Barley, *Linlithgow* Meaſure, if it be hived, or caſt, as we call it, before the 10th of *June*, will probably be a ſufficient one for keeping, and weigh about Thirty, or Thirty two Pounds *Dutch* Weight; It is perhaps the Shortneſs of the Winter in *England*, that makes Mr. WARDER propoſe keeping of them, when they are only Twenty five Pounds: If the Hive you are to buy is in a Place of the Country, where Hives, larger than the common Sort, are uſed, you ſhould take Care that it be ſo much heavier in Proportion.

36. I have tried the Weight of ſome Hives, and I have found them to be Sixty four Pounds a-piece, and

upwards; in each of which I conclude there was near Ten Pints of Honey, *Scots* Meaſure, allowing Five Pounds for each Pint, and about Fourteen or Fifteen Pounds for the Weight of the Hive, and Wax, with the Refuſe; and ſo I reckon an Hive of the ordinary Size, I mentioned, weighing Thirty two Pounds, will have upwards of Four Pints of Honey in it, which will ſeldom fail to keep over Year, and one weighing leſs, runs a Hazard.

37. The Way of weighing them, is this, Take a thin Deal-board, and in the Evening lift your Hive, ſet it on the Board, put ſmall Earth all round the Hive, to keep the Bees from coming out, ſtop the Entry with Graſs or Fogg, carry it gently on a Hand-barrow, or any other Way to the Place for weighing it, put the Deal-board along with it into the Scales, ſo weigh it; and when you have carried it back again, you may weigh the Board ſeparately, to know how much you are to diſcount for the Weight of it.

38. When you have purchaſed an Hive, according to theſe Directions, remove it about the Beginning of *September*, or ſooner, if the Bees have given over working, and before the Weather grows cold, for when they are taken to a ſtrange Place, they go abroad, and fly about to be acquainted with it. If the Weather is bad, while they are thus employed, many of them die. Here, by the Way, I adviſe you to diſturb them as little as poſſible, during the Winter, for it does them much Miſchief, if they are then diſquieted, eſpecially if they are provoked to crawl abroad, for they are not able to get in again, but periſh with Cold, or, tho' able to return, are ſeized with Sickneſs and Diſeaſes, and gradually pine away.

39. When the Day begins to lengthen, and the Influence of the Sun is reviving them out of their half-dead Condition, a little Diſturbance, to move them to take the Air, is not improper, if the Weather continues warm and kind: But even this is dangerous, for if bad Weather returns, many of them die, being unable to get back, if the Change be ſudden, and many of the Strongeſt

Strongeſt which eſcape immediate Death, take a Looſeneſs, of which they ſeldom recover.

40. This is beſt obſerved if there comes a Fall of Snow, and it frequently comes after the Seaſon is well advanced, then you will ſee them lying dead, and their Excrements, in brown Spots, along the Surface of the Snow.

41. Here, for the following Reaſon, it is proper to take Notice, likewiſe, that they ought not to be ſuffered to come abroad in Time of Snow, tho' the ſhining Sun may invite and tempt them. The Sun dazles their Eyes, amazes and confounds them, ſo they fall into it, and die preſently. The Way to prevent them is herein taught elſewhere.

42. If the Diſtance is ſmall, you may tranſport your Hive on a Hand-barrow, as before directed; if it is great, a ſafe Way is to lay a Cloth over the Mouth of it, every where ſo cloſe that none of them get out; then you may diſpoſe of it as you pleaſe; on a Horſe's Neck before a Man, a Pole betwixt two Men, or any Way your Diſcretion ſhall direct; if you neglect to purchaſe and tranſport in *September*, *April* is the next beſt Time; but if the Seller hath run the Hazard of the Winter, the Price will be the higher: You'll find Directions for buying in this laſt Month, when the Management of Bees, at that Time of the Year, is conſidered.

43. Now, I come to direct your Conduct thro' Winter: To preſerve your Hive from Cold, Storms of Wind and Rain, and from Mice, which are great Enemies to Bees, are eſſential Matters. Becauſe there are different Methods practiſed, as the different Circumſtances of Bee-Maſters allow, I ſhall mention the ſeveral Ways which I have obſerved: If Bees were only to be defended from ſtormy Weather and Cold, or if they were only to be preſerved from Mice, the Matter would be much eaſier; but when both the Weather and theſe Vermin conſpire againſt them, the Taſk is the more difficult.

44. Such as are not Proprietors of Land, or have not Leaſes for ſeveral Years to run, and therefore cannot reaſon-

reaſonably put themſelves to the Charge of Bee-houſes commonly thatch over their Hives with Straw, which when the Work is done neatly, and the Straw laid on thick, makes a good Defence againſt bad Weather; but Mice are very apt to neſtle in the Straw, to cut out a Way to themſelves, to deſtroy the Bees, and to conſume the Honey. To prevent which, lay the whole Hive over, in *September*, with Plaiſter-lime, and when it is fully dry, cover it with the Straw; this anſwers both the Intentions aforementioned; but ſtill this Inconveniency remains, that the Strength or Weakneſs of ſuch Hives, cannot be right judged of by poiſing them in one's Hands, and this Way, in a great Meaſure, fruſtrates the buying of Hives by Weight.

45. Another Way of preſerving Bees thro' the Winter, is by making Covers of Deal-boards for every particular Hive, and liming them all around, cloſs to the Stone or Board whereon the Hive ſtands, only preſerving an Entry for them. Theſe Covers make noble Defences againſt Mice; but the Sun ſoon makes them rent, the Rain gets in, and the Hive grows rotten and mouldy, which exceedingly diſobliges the Bees.

46. To prevent this Inconveniency, ſome make Covers like Barrels, with Iron-hoops around them: Theſe Covers cling, as we ſay, with the Summer's Drought, then they drive the Hoops ſtrait, which makes them tight again; but neither will this do ſo well as could be wiſhed, for the Winter-rains ſwell them, and make ſuch a Preſſure, as cauſes the weakeſt Staves or Boards, of which they are made, to ſtart out of their Places, and ſo the Rain gets in.

47. A Way, ſo far as I know, never tried, might be taken by Gentlemen for ornamenting their Parterres, or Flower Gardens; 'tis to make leaden Covers for their Hives; theſe they cauſe caſt in different Shapes and Figures, and ſet them on Pedeſtals; I know not, how this Propoſal will take, but it would pleaſe me exceedingly to know, that each of theſe Ornamental Figures, had a Family of theſe highly profitable and wonderful

living

living Creatures in it; beſides, you ſee it fully removes the Objections, the firſt two ways are liable to.

48. Other Sorts of Covers are uſed, but, as I have ſeen none, that are better than theſe mentioned, I paſs forward to give ſome few Directions to ſuch as uſe, or incline to uſe any of theſe deſcribed.

49. Let ſuch as choiſe Straw, be ſure to put it on thick, and cauſe it to riſe pretty high in Form of a Piramid, for, if it lies flat, it will not ſo well defend the Rain; it ſhould be wrapt with a ſmall Cord, and tied down to the Stone or Board, whereon the Hive ſtands, that it may not be blown away with the Wind, or rub'd off by any Accident.

50. From Time to Time, you ſhould take a narrow Inſpection, if Mice begin to lodge in it; to this Purpoſe you ſhould be frequently pricking it up and down with ſome ſmall iron Inſtrument, to try if you can diſlodge them; I have ſometimes thought, that Tar boiled to ſuch a Conſiſtence, that it would not penetrate too far into the Hive when rub'd with it, might prove an Antidote; I reſolve to try it, but, till I find it anſwer, I don't recommend it as a *probatum*.

51. Such as reſolve to try the Covers, whether Leaden or Wooden, ſhould cauſe them to be made ſo large, as they may allow the Hive to be laid over with the Refuſe of Flax, commonly called *Pob-tow*, or ſome ſuch dry Stuff, before the Covers be put on, when ſpecial Care ſhould be taken to lime the Entry neatly, that the Bees, going out and in, may find no Paſſage to lead them betwixt the Hive and the Cover; Covers with dry Stuff betwixt them and the Hives, preſerve Bees well in Winter, and the Beginning of the Spring from the Cold; whatever Cover you intend, put it on whenever the Bees give over Work, and while the Weather is dry; for if you cover your Hive when wet or moiſt, Mouldineſs will thereby be occaſioned; which, as has been obſerved, is hurtful.

52. The two Scourges that prove moſt fatal to Bees, and ſometimes deſtroy more than the Half of our Hives

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in one Year, are Cold and Hunger. Whenever the Cold increaſes, they fall into a Lethargick State, in which they take little, if any, Suſtenance, and when it ſoftens, they revive, and their craving for Food returns: Thus the ſofter the Air continues during Winter, the more Honey the Bees conſume, and conſequently they run the greater Hazard of ſpending their whole Stock, before the Flower-ſeaſon comes round again, ſo they are in Danger of being ſtarved: On the other Hand, if they are not numerous enough in the Hive, or if the Winter is inclement, they very probably may be killed by the Cold.

53. A certain Degree of Cold in Winter, is therefore favourable for Bees; that which only pinches or benumbs, ſecures them from the Danger of ſtarving; that which does not pinch them, may occaſion their being famiſh'd, and that which pinches and benumbs them too much, is mortal: Hence it is, that Bees, during ſevere Winters, are expoſed to periſh thro' Cold, and in ſoft Winters to be ſtarved to Death; both which we ſhould endeavour to prevent.

54. When you cover your Hive, make the Entry to it ſo little, that a Mouſe may not get in; if ſhe does, ſhe'll kill and eat all the Bees, one after another, and perhaps not meddle with the Honey, until they are all deſtroyed. I have known People very much ſurpriſed, to find a Hive with Plenty of Honey, and no Bees dead or alive in it; from whence they concluded, that the Bees had taken ſome Diſguſt at their Habitation, and had gone elſewhere, juſt as they thought in the Caſe of the Death of a King, aforementioned; but if you look to the Board or Stone whereon the Hive ſtood, you'll find it ſpread over with Wings, Legs, and other ſmall Fragments of the Bees, which the Mice had carried out to eat.

55. The Way which I uſe to leſſen the Entry is this; I take a Piece of Wood ſquare, above four Inches long, and cut a Door-way in it, the Length of three or four Inches, and a Quarter of an Inch or ſo in Breadth, that the

the largeſt Bee may eaſily paſs it. I fix this, with a Needle and Pack-threed, in the Mouth of the Hive made to receive it, and leſſen, or thereafter enlarge it, by a Bit of Lime or Clay, according to the Seaſon of the Year, and as I ſee Occaſion for letting out and in the Bees, and debarring the Mice, and other Enemies that go into Hives. Others, for preventing any of them from reaching the Bees, direct the fixing of little Plates of Tin round the Entry, which ſerve them for Doors, in like Manner as at the Windows of Dove-houſes, to prevent Polecats from creeping into them.

56. The Houſe-lark, a little dun Bird with a black Bill, the Swallow, Sparrow, Moth, Spidders, Waſps, Hornets, Earwigs or Ermits, Toads, Ants and Snails, are all of them Enemies to Bees, as well as Mice, take all the Ways you can to deſtroy them. But,

57. Upon this Occaſion, I ſhall here relate a very curious Story from *Spectacle de la Nature*, or, Nature diſplayed, being a Part of a Dialogue betwixt the *Count de Jonval* and the *Chevalier du Breuil*.

58. *Count*. " A few Days ſince a Snail took it into " his Head to ſteal into the Glaſs-hive in my Window. " There was no Entrance to paſs thro' but the pro- " per one, and at length in he went. The Porters re- " ceived him very rudely at the Gate; and the firſt At- " tacks they made upon him with their Stings, obliged " him to march with more Expedition: But the ſtupid " Animal, inſtead of retreating, thought to ſave him- " ſelf by going forwards, and he advanced into the " very Middle of the Hive; upon which a whole Troop " of Bees faſtned upon him at once, and he immediate- " ly expired under their Strokes. The Conquerors were " then in no little Perplexity how to get rid of the Car- " caſs, and a Council was inſtantly held upon that Oc- " caſion.

59. *Chev*. " And your Lordſhip, without doubt, un- " derſtood all their Debates.

60. *Count*. " From firſt to laſt. The moſt experien- " ced Sages among them reaſoned in this Manner: To

drag

" drag the Carcaſs out by main Strength, is an Impoſ-
" ſibility; the Maſs is too unweildy, and, beſides, the
" Body is fixed to the Floor of the Hive by its own
" Glue; and, to leave it where it lies, would be very
" inconvenient, becauſe it would prove an alluring
" Regale to the common Flies, and, at the ſame Time,
" be liable to Corruption and Worms; and theſe
" Worms, when they have devoured the Snail, will in-
" fallibly aſcend to the Combs, and attack the young
" Bees. The Damage was evident, and required an
" immediate Remedy, but you will hardly gueſs the
" Dexterity with which they accompliſhed it. *Cheva-*
" *lier*, I would be glad to know your Sentiments on
" this Affair. How were they to conduct themſelves
" on this Occaſion?

61. *Chev.* " So quick upon me, my Lord? You are
" really very ſevere, to put the Queſtion to me; for it
" will appear that the Bees had more Preſence of Mind
" than myſelf. But pray, How did they proceed?

62. *Count.* " They incruſted the whole Snail with
" Glue, and cemented it ſo cloſs, that all the external
" Air was excluded; and as no Inſect could have Ac-
" ceſs to depoſite her Eggs in the Carcaſs, ſo when this
" ſhould be reduced to Corruption, no malignant Steams
" would tranſpire through the Incloſure.

63. *Chev.* " Will your Lordſhip let me ſee the poor
" Snail's Tomb?

64. *Count.* " You ſhall have a Sight of it to-day.
" It wants nothing but an Epitaph."

65. For a general Direction where to ſet your Hives, or build your Bee-houſe to be after-mentioned, The Place freeſt from Wind, and moſt expoſed to the Sun, is the beſt; yet every Place where the Wind does not beat upon the Hives is not ſo, for they may be ſet in a Place ſo wall'd around, that the Wind cannot harm the Bees, while they are within theſe Walls, and yet, nevertheleſs, this may be a very improper Situation; for if they have no other Way to go abroad for their Food, but over the Tops of high Walls, the Wind comes upon them

them in a Surprize, beats them againſt the Stones, and kills Multitudes.

65. Therefore a Place, by Nature or Art, ſo ſcreened from Winds, (eſpecially the Southweſt, which is the frequenteſt and ſtrongeſt we have) as they can fly, (having the Advantage of the Sun, under the Cover of a Wall, or Planting, or hollow Glen, or the like) to proper Places to feed in, is the beſt Situation: They'll improve an Advantage of this Kind wonderfully, by flying cloſe to the Ground under theſe Covers: I would rather want a great Deal of the Sun-ſhine for Bees, than that they ſhould be deprived of ſuch a Shelter. This Direction is of great Uſe in high Situations.

66. If the Place have Water-ſprings, Rivulets, or Ponds by it, 'tis ſo much the fitter; if there is no Water, but at a great Diſtance, you muſt ſupply them in the Drought of Summer, in a Plate or other convenient Veſſel, and Numbers of them will repair to it for Drink; no doubt, to make the Honey and Wax they bring Home in their Bellies of ſuch a Conſiſtence, as they may manage it the more eaſily: You muſt be ſure to throw ſome Straw or Graſs upon the Top of the Water, that they may pitch upon it, and drink, without being in Hazard of drowning; or an eaſier and ſurer Way may be, to ſprinkle Water upon the Buſhes, Flowers, or Herbs, near their Hives, and they will drink up the Drops greedily.

67. If it be expected, that I ſhould here direct what Plants ſhould be propagated near an Apiary for the Food of Bees; all I ſhall at this Time ſay upon this Head, is, the more of the flowering Kind that are planted, and the more differing they are in their Times of flowering, the better, for the Bees will be ſo much the longer provided; 'tis better to have a Competency for all the Seaſon, than to have a Superfluity for only a Part of it; I know no Flowers they refuſe, except of Alder and Rue, according to the natural Hiſtorian aforementioned; and with him, I am apt to think, That Hen-bane, Milk-thiſtle, Hemlock, and ſuch like, whoſe Juice is known to be hurtful,

may very poſſibly communicate their Malignity to the Honey extracted from them; for this Reaſon, I would make no Difficulty to grub up all ſuch pernicious Weeds in the Places adjacent to my Hives.

68. Now, I think, I have directed you how to bring your Hive ſafe to the Month of *April*, the Time, when Bees commonly ſet out in our Country to their Work, and when they begin to increaſe their Family; for which End they lay their Eggs in Cells, and go abroad to fetch in that Stuff commonly called Bee-Bread, concerning which, its Preparation and Uſe in feeding young Bees, from their firſt Formation, until they are able to provide for themſelves, you ſhall be informed before this Treatiſe is ended, in the Anſwers to Queſtions relative to theſe Matters.

69. When the Weather is inviting, and your Bees are flying out and in, and when they are bringing in Plenty of this Stuff upon their Thighs, then you may conclude, all is well with them; but, if you find them at Work, and yet not bringing in this Stuff, then you may ſuſpect, that they have loſt their King ſome Way or other, and that, therefore, they will turn to no good Account.

70. You'll be more able to judge of this Matter, when you come to have ſeveral Hives over Year, and of other Things to be treated of concerning them, by comparing one Hive with another, or your own with thoſe of your Neighbours; however, if your Hive have any Conſiderable Weight, and your own, or your Neighbour's Bees are fallen to work, and yet, the Bees of the Hive you ſuſpect, bring in Nothing upon their Thighs, 'tis plain, they have loſt their King, as I have ſaid.

71. The Reaſon why I ſpeak of Weight, is, becauſe when an Hive falls ſhort of Proviſion ſoon in the Year, and conſequently grows light, they'll be going out, but bringing nothing in; ſo you ſee, that 'tis by the Weight, that you are to diſtinguiſh, whether it be Want of a King, or Want of Proviſion that ails them: But of this more by and by.

72. In the mean Time, it may be remarked, That an Hive

Hive well choſen and right managed, ſeldom wants Proviſion ſo ſoon; for 'tis commonly a Storm in *May*, that kills the Bees for Want of it.

73. About the Beginning of *April*, they only begin to bring forward a new Family, which, againſt the Beginning of *May*, comes to be very numerous; then the Conſumption within is far greater than the Supply from without, the Flowers in our Country yielding little Honey ſo early; and thus it comes to paſs, that the beſt of them all will run ſhort of Food, if a Storm of any Continuance happens at this Seaſon, when a weaker one with a ſmall Family will ſuffer leſs, as I hinted before.

74. It being a nice Point to determine, when Bees want Proviſion, and what is the propereſt Method to be obſerved in giving them Supply, I ſhall treat of it the more fully, and beg to be excuſed, if I ſeem to make Repetitions.

75. Suppoſing then that a Storm comes in *May*, and continues for ſome Time, you have Reaſon to be afraid your Bees ſuffer Want, and ſhould look to them daily, to ſee if you can diſcover any of the following Signs of it.

76. 1*ſt*. You ſhould try the Weight of your Hive, if you find it light, you have good Reaſon to be afraid; for, at this Seaſon, when they have a great Number of young, the Hive will be of a conſiderable Weight, tho' their Proviſion be run, but when it falls ſhort, before they begin to breed, the Hive will feel in your Hands, as if there were little in it.

77. 2*d*. If the weighing of your Hive does not ſatisfy you, as truly, I would not have you ſatisfied with it; then you muſt liſt up the Edge of it pretty high, if you find the Bees make a Noiſe, and come down to ſee, what the Matter is, 'tis a good Symptom, if otherwiſe, bad.

78. 3*d*. If you find any great Quantity of young Bees lying on the Board or Stone, either within or without the Entry, or on the Ground before the Hive, 'tis a Sign they ſuffer Famine; for, at this Time of the Year, whenever they are pinched for Food, they throw out great

great Numbers of young Bees, eſpecially Drones, ſome of them perfectly white, being not quite formed, others grey-coloured, and to Appearance perfect, but, as they cannot ſhift for themſelves, they crawl about until they die.

79. 4. If a good Day comes, and your Bees do not fall heartily to Work, you may conclude their Store is gone, yea, tho' they be flying out and in, if they are not taking in Work upon their Thighs, all is not well with them; for as I hinted a little before, they are in this Caſe juſt as when a Hive has not a King; but, if you give them a hearty Meal, you'll ſee them, the very next Day, fall chearfully to Work, and come home with loaden Thighs. Thus you may plainly diſcover, whether it is want of Food, or want of a King that ailed them.

80. If you find by theſe Directions, That your Bees are in Hazard for want of Food, your are immediately to ſupply them; but, before I proceed to give you Advice concerning this Matter, I ſhall anſwer an Objection which naturally falls in here, *viz.* What is the Neceſſity for letting their Proviſion be ſo far run, as to endanger them, when a little Honey, their moſt natural Food, or even a little Sugar and Water, or ſweet Wort, given at a Venture, would not only ſave their Lives, but alſo prevent the Trouble of obſerving daily, whether they are in Want or not. To this I anſwer, That they are not to be fed at all, unleſs they are in a famiſhing State; the Reaſons are:

81. 1*ſt*. 'Tis exceedingly troubleſome to give them Food, in ſuch a Manner, as to prevent their falling out about it, eſpecially if you have more Hives than one; for the neighbouring Bees are very ready to ſcent it out, which frequently ſets all the Hives in the Garden, and, perhaps, in the Neighbourhood too afighting, which occaſions much Miſchief.

82. 2*d*. The giving them Meat, at this Time of the Year, brings them all down from their ſeveral Poſts, and ſo by neglecting the Performance of their Duty to the young,

young, they receive a wrong Formation, and great Multitudes of diſeaſed ones will be found crawling on the Ground; tho' you'll diſcern little, if any Blemiſh about them, yet they are good for nothing. Now I humbly think, that theſe Reaſons, with what you'll afterwards hear concerning their Wars, may apologize for giving you the Trouble of this Enquiry concerning their having or wanting Food: I next proceed to direct how to feed them.

83. Take a Pewter or Earthen Plate, larger than the Mouth of the Hive, put Honey in it, brought to ſuch a Conſiſtence, by Water mixt with it, as they may lodge it conveniently in their Cells, and that all the candyed Bits may be broken and diſſolved. Set the Hive on it, after laying over the Honey, a Sheet of ſtrong Paper pricked full of Holes, that the Bees may eat the Food, juſt mentioned, without Hazard of drowning, or its ſticking to their Legs, then clay it all around, and ſhut the Entry with Graſs or Fogg.

84. Let this be done in the Evening, when they have given over working; and, if poſſible, in a cloudy, miſty Day, when the Bees come leaſt abroad: Remove the Plate next Morning, that their Neighbours may not find the Smell of it. You are alſo, for the ſame Reaſon, to take Care that none of the Honey be ſpilt upon the Ground, or about the Hive, if it is, 'tis ten to one, but they fight about it; ſo you ſee how fooliſh the ordinary Way of feeding, which expoſes them to ſo great Hazard, is.

85. In caſe you have not a Plate of the Size aforementioned, cauſe make a hollow Place in a thick Deal-board, ſo large as to contain a Plate or Aſhet with the Honey, and place it ſo in the Board, and the Board ſo under the Hive, that the Brim of the Plate may not hurt the Combs; then ſhut up the Hive, as before directed, This Deal-board ſhould be as large as the Boards or thin Stones whereon your Hives ſtand, and may be kept for feeding your Bees from Time to Time.

86. Another Way of feeding, and which I think beſt in the Spring, when a ſmall Quantity of Food may probably be ſufficient, is to turn up the Hive, and to pour the

the Honey prepared, as directed, but ſomewhat thinner, here and there upon the Combs, ſo as it may run down amongſt the Bees; which Method has this Advantage of the other, That it does not bring them down from their ſeveral Stations; and tho' it ſeems to be a coarſe Way of doing, it will anſwer the Deſign very well. Poſſibly a young Beginner will think this an hazardous Undertaking, but there's no Fear, even tho' the Bees be lively.

87. As to the Quantity of Honey, you may take a Pound or ſo, which I think is ſufficient for one Time, tho' ſome direct a Pound and a Half, or two Pounds: You may intermit the Night following, or, if you think there is no great Danger, you may wait till you ſee how the Weather turns out; for if 'tis ſo far in *May*, that the wild Muſtard among the Corn is flowered, one good Day's Work upon it will afford eight Days Proviſion; but if the Scarcity happens before the wild Muſtard, one of our earlieſt flowering Plants of the wild Kind is bloſſomed, the Bees muſt be taken Notice of the more carefully, and while you find Occaſion for it, you muſt continue to feed them.

88. I ſhall next inform you, how to do with an Hive that hath loſt its King. I ſuppoſe you'll know by this Time, whether 'tis a King or Proviſion that's wanted. If a King, you muſt let the Hive be doing, the beſt Way it can, till your firſt Hive ſwarm; then put the young King and his Company upon it, whom they'll receive very chearfully, and theſe two united Hives will make a very good one before the End of the Seaſon. The Way of putting a young Swarm to any old Hive, you ſhall be taught afterwards. In the mean Time, I proceed to ſpeak of their Wars, and to direct you how to put an End to them.

89. Bees have a martial and unpeaceable Spirit, and ſtrive to enrich themſelves at the Expence and Ruin of their Neighbours; for when no Honey is to be had among the Flowers abroad, they will venture their Lives, and rob for it; then not an Hive within their Reach is left

left unaſſaulted: I ſhall firſt, before I propoſe Remedies, teach you how to know when they are engaged in Battle.

90. 1. You'll perceive Bees going out and in to the Hive, which is receiving the Injury, early before other Bees are fallen to Work, and at Even when other Bees have left Working; they will alſo be doing ſo at the Hive that is committing the Robbery, for theſe Plunderers find this the beſt Time for their Purpoſe, becauſe they meet with the leaſt Reſiſtance.

91. 2. You'll find them meet with Reſiſtance, and the further the Day is advanced, they will be the more reſiſted, until the Evening come on: You will likewiſe obſerve theſe Robbers hovering in their Flight, about the entry of the injured Hive, as Bees of a new Hive do for ſome Days about their old Quarters, and then you may ſee ſome of the injured Bees running about the Entry, bending up their Wings, and catching at every Bee that lights upon the Board. If they find, upon Examination, that it is a Friend, then 'tis allowed to paſs; if an Enemy, 'tis immediately ſeized, and muſt either fight or be killed, or fly, if it can get off: You may alſo perceive the injured Bees, now and then, haling out a Robber, which they have apprehended within Doors, and likewiſe ſee ſome of theſe Robbers coming out in ſuch a Hurry of Eſcape, as will often occaſion them to tumble down head-long in the Flight: While the Battle continues hot, you will perceive great Numbers of Bees falling down ſlain on the Ground, before the Hive.

92. So ſoon as ever you find them engaged, endeavour to put an End to the War in the very Beginning, for 'tis then done more eaſily than afterwards. For this End, leſſen the Entry to the Hive that is getting the Wrong, to ſuch a Degree, that only two, or at moſt three Bees, can go out and in at once; for doing of which, ſtraiten the Entry, as before directed, for holding out Mice.

93. If, upon the firſt Appearance of Robbery, you leſſen the Entry whenever their Work is over at Night,

Night, and enlarge it the next Day, when they begin to be throng at Work, that they be not impeded in their Labour by ſo ſmall a Paſſage; by doing this, regularly, for ſeveral Nights together, further Diſorder will be prevented effectually.

94. The Reaſon is plain. The Nights are yet cold, 'tis the weakeſt Hives, as I told you, that ſuffer this Calamity, the Bees therein being the leaſt numerous; and the Cold therefore affecting them moſt, they go up high among the Combs, ſit cloſs together, and preſerve Heat, as if it were yet Winter. Thus the Door is left without a Guard, and thus they become a Prey to their Enemies.

95. Now, as the ſtraitning of the Entry makes their Habitation warmer, cheriſhes them, and brings them down nearer to the Door, ſo they can the better examine who comes in, and are in the better Condition to make Reſiſtance; for now, that the Paſſage is ſo little, a ſingle Bee, or two, can make a more effectual Defence, than twenty or thirty could do before; and hence it is, that the Robbers, meeting with ſo ſtrong Oppoſition, give over making further Attempts.

96. But if there hath been a great Slaughter of the weaker Party, before you knew the War was commenced, perhaps this Remedy may prove ineffectual. In that Caſe, you muſt either, for ſome Days, ſhut up the Hive that is attacked altogether, that the Deſtroyers coming, from Day to Day, for Spoil, may be wearied by Diſappointments, and give over their Deſign, or carry away the Hive to ſome other Place, at leaſt to a Mile's Diſtance; for, if 'tis ſet within Bounds known to the Robbers, they will renew the Attack; or, if you can do no better, take a deſperate Cure for a deſperate Diſeaſe, and animate your diſtreſs'd Bees, as directed by Mr. *Thorley*, to fight like Devils, by diſturbing them with a Bunch of ſtinking Madder, (I ſuppoſe any other ſtinking Plant will do) tied to the End of a little Stick of a convenient Length, till they begin to ſhew their Reſentment. Then you'll ſee them ſeize the robbing Bees,

Bees, and tumble them down in great Wrath, ſo you may aſſuredly infer their Safety. They will beſt defend themſelves. At the Time you are thus employed, it is needful to give you a Caution to take Care of yourſelf. But ſhould your Hives thus attacked have but a few Bees, and little Honey, it is better to take them than to ſtand a Trial.

97. Thus I have led you on Step by Step, and thro' ſeveral Difficulties, to the 20th of *May*, when it may be preſumed, that the wild Muſtard, and ſome other flowering Plants are bloſſomed, and ſo that your Hive is paſt Hazard of Famine; next, that you may know when your Bees are ready to ſwarm, or caſt, I adviſe you, now and then, to lift up the Edge of your Hive, and look in; if the Spring has been forward, you'll obſerve them, their Family being increaſed, in conſiderable Numbers below the Combs, by the Beginning of *May*, and if the Weather continues good, they will come more and more in View, and make a buzzing Sound in the Night-time, which will ſtill increaſe till they caſt. But, if a cold Storm comes, they will draw cloſs together, and out of your View among the Combs. They will alſo deſiſt from making a Noiſe.

98. As they increaſe in Numbers, they begin to water, and you will find ſome Drops of inſipid Liquid, upon the Board or Stone before the Entry, which ſometimes runs over upon the Ground. This is, no doubt, the Exhalations occaſioned by their Warmth, which, being condenſed by the external Air, falls in Dops, as I have ſaid; but, when they grow very ſtrong, this Water is not to be found.

99. The Reaſon is probably this, That when their Heat grows very great, as you'll find it, if you hold your Face or Hand to the Door, it forces theſe Exhalations a good Way off, before the external Air is ſo cold as to condenſe them; ſo inſtead of falling on the Board or Stone, as at firſt, they will now fall upon the Ground, and are there imperceptible; but the moſt certain Sign, which proclaims that Event to be the very Day, is when

the Bees forbear flying into the Fields, tho' the Season is inviting.

100. Before I go on to advise you about the swarming or casting of your Bees, I shall here say a Word or two concerning the Entries and Covers of Hives. This you possibly expected ere now. As to the Entry, it must be gradually enlarged, as the Bees grow thronger at Work; you can easily judge what is sufficient, and may manage accordingly with a Bit of Clay, by which, as aforesaid, you may either enlarge or straiten the Entry, as you see Cause. If a Storm comes, you must straiten it, to keep the Bees warm, and if Enemies attack, you are before directed to do it.

101. If you expect that I should advise you, to remove the Winter Cover from off your Hive, that the Sun may have Access to play upon it, you are much disappointed, for it is far better that you keep it on; because, when the Hive grows very throng, and yet not quite ready to cast, the intense Heat of the Sun upon it, when uncovered, so stifles the Bees within it, that they come out, and hang in great Clusters about the Hive, which frequently puts them so out of their Measures, that a Hive, which, to Appearance, was ready to cast, will lye out this Way for several Weeks.

102. When this happens late in the Year, it makes the young Hive of small Value, not having Time to do much in that Season, and sometimes, when bad Weather comes, it will put the Bees from swarming, which is a great Loss.

103. They are very unmanagable, when they take this Conceit of lying out in Clusters, and I know nothing that prevents it so much, as keeping on the Winter Cover all the Year round: an Excess of Cold, and an Excess of Heat, are both prejudicial; it serves to prevent the one in Winter, and the other in Summer.

104. When by raising the Side of your Hive, you discover it to be quite full of Bees, you should be on your Guard likewise, when you find the Water dried up, it denotes that they want Room, as I said before,

and when they come out and hang in Clusters, that is another Sign of it; any of these prognosticate, that the Time of their swarming draweth near: By this Time also, the Drones will begin to make their Appearance, and your Hive will be making a Reel, as we call it, once every Day, which a young Bee-master is apt to take for swarming, till he be otherwise taught by Experience.

105. This reeling is occasioned, by a great many of the Bees flying, and making a confused Motion and Noise in the Fore-part of the Hive, much after the Manner of Gnats, when they make that Motion we call Midges dancing: They make this Reeling all the Year round, even in Winter, in a very fine Day, but now they do it every Day; which is the Cause why I have taken Notice of it here.

106. Tho' the Bees should not ly out in Clusters, yet, every Morning when they come abroad to work, a great many of them will stay about the Door, upon the Board or Stone, and perhaps scatter themselves around the Entry of the Hive in a large Circle. This they will probably do for several Days before they swarm; you'll likewise by this Time observe, that when they give over working in the Evening, they double, triple, or quadruple their Guard, which some Time ago consisted, only, of a single Centinel or two standing Centries in the very Passage, or within it, with their Tails outward, and bending up, and their Wings in a continual Motion, making a humming Noise; but now you'll see ten or twelve about the Door in the same Posture and Motion.

107. When you make these Remarks, you should cause watch them constantly, from before Nine o'Clock, till the Height of the Day is more than past, and their Throng is fully over; 'tis likewise convenient to have an Hive provided and in Readiness for the Swarm, concerning which, take the following Directions.

108. If your Bees swarm in *May*, or first Week of *June*, your Hive should be somewhat larger than the old one, especially, if the Swarm is large, Which a young

young Bee-maſter cannot eaſily judge; neither can plain enough Directions be given to make it known, tho' Obſervation and Practice will teach it.

109. If they ſwarm in the ſecond Week, the new Hive may be juſt of the Size of the old, but it is better that it ſhould be little, than too big; becauſe, a little one can be enlarged, as Need requires, but one too large makes a cold Habitation for them, all the Winter over, there being empty Room in it; beſides, it occaſions that they don't ſwarm early next Year, having the Void to make up in the Spring, before they ſwarm.

110. I need not direct you to put Sticks in your Hive, for every Body does it; keep an Inch of one of the two lower ones, which croſs other directly above the Door without to take hold of, for raiſing up the Hive the more eaſily to look how all is within it: 'Tis convenient, that the reſt of the croſs Sticks ſhould alſo be ſo long, that a Part at each End may be on the Out-ſide; for by this Aſſiſtance, one can lift or poiſe the Hive the more coveniently, and they can be the better pulled when the Combs are to be taken out, eſpecially if they be great at the one End, and gradually ſmall to the other.

111. The middle Stick, that ſtands perpendicular, ſhould be ſo long, that the End of it may juſt reach the Stone or Board, whereon the Hive ſtands: It ſhould likewiſe be pretty thick, that when the upper End of it is cut ſmall, for about the Length of an Inch, to go in to the Top of the Hive, the Stick may have a good Shoulder for ſupporting it, that the Hive may not fall flat in the Top, or yield to a Side with the Preſſure of the the weighty Combs full of Honey within, and with the Weight of Turff, or any ſuch Thing on the Out-ſide, which Hives often do, eſpecially if they are long kept, and which very much incommodes the Bees, occaſions the Rain to ſtand upon the Hives, and ſo they rot much the ſooner.

112. With reſpect to the Faſhion of the Door, take a Piece of Wood, three Quarters of an Inch ſquare, and four Inches long, cut a Door-way in it more than half thro

thro' the Stick, and leave only a very ſmall Bit at each End, whereupon it is to reſt: When this is done, cut out as much of the loweſt Roll of the Hive, as receives the Piece of Wood, which fix there with a Needle and Pack-threed.

113. This Sort of Gate, which I partly directed before, and which extends in Breadth, is certainly better than that which hath the Extention of it to the Height; for, when the loaden weary Bees pitch upon the Board before it, and run forward to go in, if they fall not directly oppoſite to the Door, they are apter to go wrong than right, and after going a good Way round the Hive, in Search of the Entry, muſt return, which is a Fatigue, and hinders them in their Work; whereas, when it is thus broad, they will rarely miſs it.

114. When your Hive is thus prepared, and after the looſe Straws, or any Thing elſe that will come off by cutting, or rubbing, are taken away, to ſave theſe cleanly Creatures a great Deal of Labour, dreſs the Top of it within with Honey, or with a ſmall Handful of Fennel, dipt in Ale, ſweeten'd with Sugar; this done, keep it at Hand, and have likewiſe ſome Veſſels of Water by you, with a Bundle of Straw, or long Graſs, lying in each of them: But I return.

115. You'll ſee Numbers of Bees flying round the Gate, in the reeling Way deſcribed, and obſerve their Increaſe and Noiſe grow greater: Thoſe about the Entry will begin to make greater Stir; you'll alſo ſee them thronging in great Haſte out of it, and thus they will continue to do, till they are all come off.

116. In the mean Time, while you are ſatisfying your Curioſity about their Way of ſwarming, you muſt have a Servant or two employed to go round them, to ſee if they are beginning to hive upon any Place, or, if they are going out of your Garden: If you, or your Servants, find them breaking of at any Side, Water muſt be thrown againſt them, to beat them back; Thus you are to endeavour to keep them within the Garden, till they pitch upon ſome Place whereon to hive, which you will

will ſoon diſcern by their gathering together to it. The Author of the *French* Natural Hiſtory and Mr. *Thorley* agree, that Noiſe made with Kettles, Pans, or any muſical Inſtrument, is a needleſs Ceremony.

117. If there happens to be a good Breeze of Wind, when they are ſwarming, 'tis a great Advantage, for this keeps them low under Shelter, and determines them to chuſe a Place much the ſooner; but, if 'tis a calm ſultry Day, they fly much higher, and cannot ſo eaſily be kept from going away; I ſhall therefore ſpeak the more fully on this Head.

118. 'Tis very ordinary for them before they ſwarm, to ſearch in all the Neighbourhood, for a fit Place to take up their Quarters in: If there is a great Houſe, a Church, or a Steeple, near, 'tis ten to one, but your Swarm may eſſay to go there, and take up their Abode, in ſome Chink of a Wall, or Ceiling of a Room, or the like, if their ſo doing be not hindred; and, if an empty Hive with Combs in it is allowed to ſtand in a Garden, it will rarely miſs of being provided with a Swarm, for in their Search for a Houſe to come to, when they leave their old Habitation, they will find this a well furniſhed one, and repair to it; but as this Practice might have a bad Tendency, there is a Law againſt it.

119. The Way to know, if they are to take Quarters of their own chuſing, is, by obſerving thoſe Places you ſuſpect, if you find Bees flying about them, or, eſpecially, if they are going out and in at any Hole, or Chink, as if a Hive was there, then your Suſpicion is juſt; for they will go ſome Days before they ſwarm, to an old Hive, or a void Place of an Houſe, carry out all the Duſt and Naſtineſs, and ſo prepare for the Family's Accommodation.

120. The Lady of a great Houſe having asked a Friend of mine, if any of his Bees were ſwarm'd, he anſwered no; there is a Swarm then, replied ſhe, of ſome other Bodies, hived in the Top of my Cloſet-Chimney; ſo ſhe carried him to her Cloſet, ſhewed him ſome Bees that had fallen down, and deſired him to liſten to the Noiſe

Noiſe in the Chimney, which, when he did, he told her, there was no Swarm there as yet, but that there were ſome Bees come there, to provide Quarters for one, which would, no doubt, follow, if they were not hindered.

121. Therefore he adviſed her to burn now and then a little Brimſtone in the Chimney, which diſobliged them; but the next Day, or the Day following, a Swarm took up their Habitation in the Ceiling of the Houſe, near that very Chimney Top.

122. They are apt to play ſuch Tricks, when there happens to be a Tract of fine calm Weather, at the Time of their ſwarming. For the Goodneſs of the Weather allows them to roam to all Places they have a Mind, tho' they be high; whereas, when the Days are not ſo good, they have not ſo much Time to ſpend in theſe Affairs, neither do they fly to ſuch high Places, eſpecially if the Wind is high.

123. Another Way to know, if they are for a Habitation of their own chuſing, is this: They'll either, in the Time of Swarming, eſſay to break out of your Garden, which you are to endeavour to prevent, by throwing Water among them, on that Side, where they are making the Breach, as aforementioned, which often proves effectual, but not always; or, after they are hived upon a Place, they will riſe again, and take their Way immediately, yea, ſometimes they go up into the Hive you put over them, and ſtay a while, and yet, will come down again, and fly away.

124. The Way to prevent which, is, in the firſt Place, to lay the Hive over them very ſoon, if they begin to go up in it, it is a good Sign, tho' not an infallible one, as you have juſt now heard.

125. Next, you are to continue a watchful Eye over them, eſpecially if they go not up into the Hive; for this is an ill Token; as long as they ly quiet, there is no Fear of them; but, if they begin to run over other, and make a Noiſe, and a continued Motion with their Wings, you may then be ſure, they are not to ſtay.

126. In this Caſe, whenever you perceive them mak-

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ing this confuſed Motion and Noiſe, you are to throw a good Deal of Water among them, with a Bundle of Graſs or Straw, which will humble them for a while; if after they dry, they begin to their Confuſion anew, you muſt water them again, and ſo repeat this Remedy, till the Evening come on, which will readily determine them to go up into the Hive; if they do, they ſeldom go away, after they have been a Night in their new Habitation, unleſs the King has gone back to the old Hive, before you began to water them: In that Caſe, 'tis in vain to imagine they'll ſtay, even tho' you have kept them a Night.

127. That very Summer, when, as I told you, the Bees were ſeeking Lodging in the Top of the Lady's Chimney, the Weather was extraordinary ſoft and warm, which occaſioned a great many Hives to fly away; in the Struggle I made to keep mine; there was one Swarm, particularly, that ſettled upon the Trunk of an Apple-tree, which made it very difficult to get a Hive to cover it, ſo as to encourage them to go up; mean while, they began to act the Part I juſt now deſcribed, which obliged me to water them from Time to Time, until the Evening: This I thought would have effectually put them up, but, to my Surprize, I found them in the Morning where I left them at Night, which ſet me a-thinking what I was to do with them next.

128. I recollected that I had an Hive in my Houſe, with empty Combs in it, which I concluded would aſſiſt me to overcome the Difficulty, and ſo it happened: I ſet it over them in the Place of the other, and, in leſs than a Quarter of an Hour, they went all up into it, and the Hive became a very thriving one.

129. I therefore adviſe you, if you have any plundered Hive, to keep it carefully for this Purpoſe; yea, if you have any late Swarm that has little Honey in it, I adviſe you to kill the Bees, and to preſerve the Hive with the Honey in it from Mice and other Accidents, that you may have it in Readineſs to ſerve you in a Pinch of this Kind; or, tho' you ſhould not have Uſe

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for it in this Way, yet it may ſerve another late Hive, and make it either the fitter for keeping, or killing: Upon theſe Conſiderations 'tis an Advantage to have ſome ſuch Hives by you, tho' there be an *Engliſh* Quart of Honey in each of them.

130. I come now to direct you how to manage, when your Swarm begins to gather together in one Place; if it hath been long ere the Bees took a Settlement, and eſpecially if they have been eſſaying to break away, or, having begun to fix upon one Place, have left it again, and choſen another, then, whenever you ſee a conſiderable Number of them together, I ſhall ſuppoſe the Bigneſs of your Fiſt or ſo, throw Water on them, which will prevent their riſing; immediately thereafter lay your Hive over them, tho' the Bulk of them be ſtill flying round about you; only take Care you kill as few as poſſible with your Feet: If they like their new Houſe, they'll ſoon go up into it, and when they are up, they will fall to Work, unleſs upon Trial they alter their Opinion, and reſolve to leave it.

131. It is ordinary whenever the Hive is laid over them, to cover it with a white Linen-cloth; but this is not material, 'tis only neceſſary that ſomething or other be laid over it, to make a Shade; an Armful of Graſs or Weeds, of no bad Smell, is as good as any Thing to hinder the Sun from beating with Violence upon the naked Hive, which is apt to make the Bees ſtartle, and diſpoſe them to leave their Quarters.

132. I might have told you, before I adviſed you to lay the Hive over them, to conſider the Place where the Swarm ſettled; if upon any Thing that can be eaſily brought to the Ground, ſuch as the Branch of a Tree, a Shrub, or the like, it ſhould be done, and the Hive ſet upon it inſtantly; but if the Hive goes ſo very cloſs to the Ground, that the Graſs and Weeds ſhut it up on all Sides, you muſt raiſe up the Edge of it with a Stone, or any Thing convenient, that the Bees may have free Acceſs out and in.

133. If they ſettle upon the big Branch of a Tree,

or the Side of an Houſe, or upon any Thing that cannot be brought to the Ground, then take the Hive to them, and put it over them the beſt Way you can: But becauſe, when they pitch upon the Branch of a Tree, and an Hive is ſet over them, 'tis ſo much expoſed, and in View, that it ſeems to be no ſecure Habitation for them, they therefore do not like to go up into it: In this Caſe you ſhould take a coarſe Sheet or Table-cloth, wrap it round the Hive and them, and bring both as handſomely down as you can, and ſo as to ſhut the Hive quite up, except a direct Paſſage for the Bees to go out and in, this will make them like the Hive the better, and go up into it much the ſooner. Mr. *Thorley* adviſes, if they ſettle on the Body or large Arm of a Tree, *&c.* to ſweep them into the Hive with a Bruſh, or a little Handful of ſmall Branches. This is beſt done when the Sun is ſet, and the Bees are, by the Cool of the Evening, become leſs animated and furious, ſays the *Natural Hiſtorian* aforementioned.

134. When your Bees ſettle in different Places, as they frequently do, if you allow them a little Time, you will find thoſe who want their King, riſe gradually and join thoſe who have one; but 'tis beſt not to allow them this Time, leſt they go back to the old Hive, and ſo make the new one inconſiderable; or, leſt thoſe who have the King fly away; you are therefore to conſider, what Cluſter can be moſt eaſily tranſported to the other, lift that, join them, and ſet your Hive over them, while both of them are lying on the Ground, if poſſibly you can.

135. It often happens, when Bees are caſting, that the Swarm goes back to the old Hive, where they will ſtay all Night, and if the next Day is good, will caſt again: This they will do, either before, or after they begin to gather in a Cluſter, or ſometimes even after they are gone up into the new Hive: In the firſt of theſe Caſes, you will ſometimes obſerve, when they are hiving, that they will not be quite come off, and yet that thoſe that are, will be going home again, making a

Croſs-

Croſs-tide at the Paſſage: Sometimes they will come quite off, fly about a little, and turn in again; this you cannot prevent.

136. If they gather in a Cluſter, and thereafter go back, you muſt wait a Day or two longer for them; but if they do this every Day, as ſometimes they do for eight or ten Days together, and are very vexatious; then you muſt either ply them with Water, as directed in the Caſe of their flying away: Or whenever you find them quite come off the Hive, and beginning to gather in a Cluſter, you might cauſe lift the old Hive ſpeedily, and carry it to a Mile's Diſtance at the leaſt, which will cauſe them ſtay; but if the young Hive does not ſettle according to your Expectation, the young King not being fully ripe and come off, you muſt certainly bring back the old Hive next Morning.

137. If they have been in Uſe to go up into the new Hive, and yet to go home again, in this Event you muſt uſe the Remedies propoſed in the former Caſe, or carry away the new Hive whenever the Bees go up into it.

138. I ſhall mention another Caſe: A great Part of the Swarm goes back in Time of Hiving, thoſe that ſtay behind gather into a Cluſter, go up into the new Hive, and fall aworking; but, not being proportioned to the Hive, it cannot be ſuppoſed, that they can turn to any good Account. In this Caſe, you muſt either put them back at Night to the old Hive, and wait their Caſting again next Day, or you muſt keep them to join another Swarm; both which you ſhall be taught to do.

139. When your Bees are going up into their new Houſe, begin to work, and have all good Appearance, you muſt let them continue in that Condition all Night; next Day lift your Hive, and ſet it in the moſt convenient Place, which is certainly where the Bees were hived, if it is on the Ground, and there be nothing to hinder it to ſtand there; for if you remove it, you'll ſee for the next two Days, a great many of the Bees

ſpending

ſpending their Time to no Purpoſe, flying about the Place where they were hived.

140. Wherever you ſet them, you muſt have ſomething provided for the Hive to ſtand on, ſuch as wooden Stakes driven into the Ground, till they are only ten or twelve Inches above it; on this ſet your Deal-board or thin Stone, and when you have it right adjuſted, that is, not perfectly level, but declining a little forward, then ſet on your Hive with the Entry of it to the South, take equal Parts of Clay and Horſe-dung, well wrought together, and put a little of this all round the Hive, which will both fix it to the Board or Stone, and keep Rain and Vermin from getting into it: You muſt alſo cover it with ſomething for keeping out the ſcorching Heat of the Sun, which might ſo far at leaſt, melt the Combs, as to diſengage them from the Hive, and make them fall down: The ordinary Thing uſed for this Purpoſe is thin Turff, called Divots, which ſhould be made ſo long as to come near to the Door, to overſhade the Hive the more.

141. The Reaſon why the Hive ſhould decline a little forward is, That when the ſtrong ſoutherly Wind blows the Rain into the Entry, it may run out again; as alſo, that the Bees may the more eaſily manage any Thing they have to take out, ſuch as dead Bees, or Clods of Naſtineſs that has gathered in the Winter-time, and all other Rubbiſh whatſoever; for when the Board declines to the Door, it gives them the Advantage of having their Burden to draw downwards, ſo they perform their Taſk the ſooner, and the leſs Stop is put to their neceſſary Work of gathering Honey; wherefore take this general Advice to contrive all Things about them ſo, as to give them as little Hindrance in their main Work as poſſible, for much depends upon a Summer's Day or two with them; and for this very Reaſon you ought to keep the Stone or Board, and every Thing within or about the Hive, as clean as you can, to prevent their Trouble and your own Loſs, eſpecially about

about the End of *March*, when every Hive ſhould be lifted up, and the Board cleaned.

142. If you want to be informed, whether a Deal-board or a Stone is properer for ſetting your Hive on, I anſwer, That, ſo far as ever I could diſcover, the Difference is very inconſiderable, the Stone is not ſo liable to have Rifts and Chinks in it, thro' which the cold Wind may get up to the Bees, and, in that Reſpect, is better than the Board; but 'tis alledged the Stone is too hot in Summer, when the Sun beats violently on it, and is therefore offenſive to them when they go out and in; as alſo, that it is cold and damp for them in Winter: Theſe may be Inconveniencies, tho' I could never be ſenſible of them.

143. The Deal-board has this Advantage, that it makes eaſier Work to tranſport them with it, than with a Stone, and you can gueſs pretty well the Weight of your Hive, by lifting the Board along with it, when you have a Mind to poiſe it in your Hands; whereas, when it ſtands upon a Stone, every Time you lift it, you muſt pull it therefrom.

144. If you chuſe the Deal-board, cauſe it to be made of well-ſeaſon'd Wood, light and well joined; but if the Stone be your Choice, you may batter on ſome Folds of Grey-paper, upon the Part before the Door, to moderate the Heat in warm Weather.

145. That Part of the Stone or Board before the Entry ſhould be four or five Inches broad, for when it is too narrow, the Bees who are weary with a long Flight, and come Home loaden, are not able to guide themſelves ſo exactly, eſpecially if the Wind blows ſtrong, as not to miſs the Board frequently, ſo they fall upon the Ground, and muſt take Wing again ere they get in, which they are not able to do, till they reſt: This makes a Hinderance in their Work, which ſhould be prevented, and to avoid this Inconvenience, I have ſometimes taken a Piece of Deal-board, of a convenient Length, to make an eaſy Slop, and have made it reſt betwixt the Ground and the Fore-part of the Board or Stone whereon the Hive

ſtands

ſtands, that the Bees might fall upon it, when they miſs the proper Place left before the Door, and climb up eaſily without flying.

146. In or about ten, twelve, or fourteen Days, you may expect a ſecond Swarm; you are not to look for it in the Seaſon, if the Time exceeds Seventeen or Eighteen, tho' the firſt Swarm went off ſoon; but you are not to expect ſuch a Solemnity at this, as at the former Swarming; for they do not ly out in Cluſters, nor ſpread themſelves about the Entry, but come off without any Ceremony, and yet ſays a curious Obſerver, you have a much ſurer Prognoſtick, than you had the firſt Time; for if you liſten, eſpecially when they have done working, you will hear one of them making now and then a very diſtinguiſhable Sound from the reſt, which he begins to do about Forty eight Hours before Swarming, with this Difference, that the firſt Twenty four Hours the Sound is much weaker, and the Intervals betwixt the Sounds are greater than in the other Day (for he is ſounding both Day and Night) when the Noiſe is louder, and much more frequent; for it will be five or ſix Minutes betwixt the Sounds the firſt Day, or perhaps more, whereas there will be but a Minute or two betwixt them the ſecond.

147. This Sound, commonly called Towling, proceeds, I ſuppoſe, from the young King, giving Signal to his Company to make ready for a March: You'll hear it performed on different Keys, and coming from different Corners of the Hive from different Kings: I cannot pretend, ſays he, to deſcribe this Sound fully to your Underſtanding; it pronounces, as it were, *Peep, peep, peep*, a Dozen or twenty Times ſucceſſively with one Breath, then ſtops, calls that ſame Way again, and ſo on, ſomewhat like a Hen-chicken peeping for its Dame, when it hath loſt her.

148. I do indeed believe, that this Noiſe is made by the King, and that there are as many young Kings in the Hive, as there are different Sounds uttered; but why this Noiſe is made before the Caſting of a ſecond

or

or third Swarm, and not before the firſt, I know not; neither can I account for ſo many Kings being in a ſecond Swarm; and ſo far as ever I could diſcover, only one in a firſt.

149. I one Day, ſays he, made a Diſcovery, which confirmed me in my Opinion concerning the Sounding of the Kings: I had an Hive which ſwarmed a ſecond Time, and, becauſe it was late in the Year, I inclined to put it home to the old Hive; which I did, by turning up the Mouth of the new Hive, and ſetting the Top of it upon the Ground, with the Edge of it touching the Board of the old Hive, that ſo they might crawl up, and go home to their former Habitation: They were ſlow in their Progreſs; ſo a Friend, who was with me, propoſed that we ſhould try to catch the King, which we concluded would quicken their Motion: Accordingly we ſet to Work, each of us with a Twig in our Hand, and when we turned over the Bees, came in View of the King, and tried to catch him; he, whenever he felt the Touch, made the ſame Noiſe we heard before Swarming, and endeavoured to eſcape, but was catched at laſt.

150. I ſhall here narrate an Obſervation, which was communicate to me by two Friends curious in Inquiries of this Kind, which proves that there are ſeveral Kings in a ſecond Swarm.

151. As they were one Day in their Garden, an Hive happened to caſt a ſecond Swarm, which ſettled on a Gooſe-berry Buſh, but when they came to view the old Hive, they found it in great Diſorder, and diſcovered a diſtreſſed King lying on the Ground before it, which determined them to put back the new Hive, to preſerve the old one, by furniſhing it with a King, but the Bees of the old Hive took Care to provide themſelves by detaching a good many of their Number, to bring back a King from the new Swarm, which they did, and which Detachment having brought away too many Attendants along with the King, my Friends found that the remaining Part was not worth keeping, and ſo they put back

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the ſaid Remainder at Night. Next Morning when they went to ſee the Hives they had put together, they diſcovered other three Kings, all lying dead at the Entry.

152. I had almoſt forgot to relate a material Circumſtance of the Story, which was, That immediately, upon finding the diſabled King, my Friends put him upon the Board at the Entry to the Hive, to try if it would quiet the Diſorder, which indeed it did, for the Bees ſhewed a great Fondneſs of him; but my Friends thinking it unſafe for them to have ſuch an Invalide of a King, determined, as I told you, to put back the Hive, ſo to provide them with a young vigorous one, but, as you heard, they ſupplied themſelves, and ſo were quiet; upon which my Friends had the Curioſity to try them again with the diſabled King; but as they ſhewed him no Reſpect, ſo neither did they offer him any Inſolence, but treated him with Neglect, which was not the Caſe when they took him to another Hive, for there he was attacked with great Fury.

153. When you find the Sounding in your Hive loud and frequent, you'll next Day have a ſecond Swarm, which you are to manage in the ſame Way as you did the firſt; if it is ſoon in the Year, and if your old Hive is ſtrong, you may have a third in three or four Days, which will give you the ſame Advertiſement as the former did; but after ſix Days you are not to expect the third.

174. A third Swarm is ſo inſignificant, that 'tis beſt to put it back, eſpecially if your two former were large, or if it is late in the Year; but if you think the old Hive can well enough bear the Want of it, then you may either put it to the ſecond Swarm; or if you have inadvertiſedly put your firſt or Top-Swarm in too big an Hive, then you may put your third to it; in any of theſe Caſes it will turn to good Account, which it could never have done by itſelf.

155. The Deſign of joining two Hives together, is either, as you juſt now heard, to make them turn to good Account in one, which by themſelves would prove

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of little Value, or to enlarge your Hives, which perhaps are of too ſmall a Size. Or, 3*dly*. to afford a King to an Hive that has loſt one. A large Hive will yield a great Deal of more Honey than a ſmall one, and yet require no more Charges or Attendance, unleſs it be a Trifle more for the Price of the Hive.

156. I make this Suppoſition, that you have two Top-Swarms hived in one Day, which you incline to join together; and becauſe you could not know which of them would be largeſt, you have therefore a large Hive provided for each of them. When you have got them both houſed, you muſt conſider which is the largeſt, becauſe the ſmalleſt muſt be put into the Hive which contains the biggeſt; this is a good Way to prevent their fighting; for when a large Swarm is put into an Hive upon a ſmall one, being conſcious of their own Strength, they reſolve to make good their Quarters, while the leſſer one in Poſſeſſion, will not yield until ſuperior Force prevail, thus they commonly fight.

157. Wherefore, when the Evening comes, take the Hive with the ſmalleſt Swarm, turn up the Mouth of it, ſet it firm in the Middle of the four Stakes which you had driven into the Ground, for the Hive to ſtand on, ſet the Mouth of the other Hive upon it immediately, and ſo fix them, with a Cloth about them, to ſtand all Night, that the Bees may go up with their Conveniency. Next Morning you'll find a dead King lying in the empty Hive; but becauſe, even in this Caſe, they will ſometimes fight, tho' very rarely, therefore 'tis a better Way to ſpread a Cloth upon the Ground, to take, betwixt your Hands, the Hive, wherein the Swarm is that you would join to the other, to give it a Stroke upon the Cloth to make all the Bees fall out of it, to ſet the other Swarm over it immediately, and to leave them to go up. If any Bees remain in the other Hive, lay it down with the Edge of it to the Entry of the full Hive, that they may go in with the reſt. This puts them in great Confuſion, and puts fighting out of their Mind.

158. But a better Way yet, if both Swarms come off about the ſame Time, is to join them together as you was directed, in the Caſe of a Swarm divided, and hived before the other Hive ſwarmed; then, when it is hived, carry it to the firſt, and put it below the Hive, if it can be done; if it cannot, take any of the Ways with it aforeſaid.

159 Theſe are the Ways of putting Hives together, which may be very well done, tho' they are not ſwarmed at one Time, for a young Hive may be put to any other Hive, whether it be of the ſame Seaſon or not, by the methods juſt now directed.

160. There is another Way of joining Swarms; it is this. So ſoon as the Swarm is hived, which you propoſe to put upon an older Hive, whether of the ſame Seaſon or not, take the old Hive, as if it were an empty one, and ſet over the young one. This I have not experienced, but believe 'tis the beſt Way, becauſe both Hives being thereby put in Confuſion, they will be the leſs apt to fight, and they are leſs diſobliged at an Injury in the throng Time of their Work, than when they have left it off, or before they begun it, and have their Guards ſet. As for theſe Bees that are abroad when you lift their Houſe, they will either fly about the Place where the Hive ſtood, till the new Swarm be gone up, when you may bring the Hive again to its Place, or they'll find out the Place where it was carried to, and go to it, or elſe they'll go to ſome other Hive, which is no great Inconveniency; but if the young Swarm has gone a great Way off, or to ſome high Place, which makes it inconvenient to carry the old Hive to it, then you muſt take ſome of the other Methods.

161. There is not ſuch a Nicety to be obſerved in putting back an Hive to the Hive it came from, as there is in joining two other Swarms together, for there is no more to be done in the firſt Caſe, but to ſhake them out of their new Habitation upon a Cloth, which has a Selvadge of it, fixed along the Edge of the Board, on which the old Hive ſtands, that they may thereon crawl

up

up and go home; or, to turn up the Mouth of the new Hive, and cauſe the Edge of it touch the Board of the other, and ſo let them go up that Way; or, if you pleaſe, let them hang upon the Twig or Branch on which they ſettled without an Hive over them, and then convey them at Night, and ſhake them off about the Door of the other Hive. But this Way is not ſo good, for when they are allowed to hang in a Cluſter, they are apt to go away, unleſs you water them now and then.

162. If your Hive ſhall be long in caſting, either by Reaſon of the Bees having been pinched for Food in the Spring, or by Reaſon of their lying out in Cluſters, then the beſt Way is to enlarge it, and ſo hinder them to ſwarm that Seaſon, for the young Hive would turn to ſmall Account, having ſhort Time to work; but the Bees thus kept together will make the old Hive a good one.

163. If they do not ſwarm before the End of *June*, you had beſt take this Way, unleſs they have been kept back with bad Weather, and you live among Muirs and Meadows. In this Caſe, if they go off in the firſt Week of *July*, they may do well, for the Swarm will be large, and the late Flowers will provide them plentifully.

164. When they ly out in Cluſters, ſome ſweep them down with Nettles, or other Things. I never found the Advantage of this, tho' I do not diſſwade from it. The moſt effectual Remedy that I know of is keeping the Winter-covers upon Hives, as I formerly mentioned, and keeping ſtrong Hives over Year, that they may be ſoon ready; for a Swarm ſeldom lies out in Cluſters in the Beginning of the Seaſon, becauſe, being ready againſt the firſt hot Weather, they then make way; but when the Weather grows ſo very warm, that they are not able to ſtay within, and yet are not ready to ſwarm, then they ly out.

165. If your Top-Swarm has got good Weather, and is full with Combs, and throng with Bees, and there is yet a great Deal of the Seaſon to come, then you ſhould

enlarge

enlarge it, to prevent Swarming, which ſhould not be ſuffered. If the Seaſon is advanced to the Middle of *Auguſt*, or farther, and yet you are afraid that your Hive ſwarm, then you ſhould take five or ſix Bits of Wood, Inch thick, or a little larger, put them under the Hive, at equal Diſtances, and put Clay all around to fill up the Vacuities, which will give them more Air, and when working Time is over, theſe may be removed; but if the Hive is full by the End of *June*, or Beginning of *July*, you may enlarge it three or four Inches thick, concerning the Removal of this larger Eek, you ſhall be adviſed when I come to ſpeak in general of the removing of Eeks.

166. Some chuſe Eeks of one Kind, ſome of another. Straw made like the three or four loweſt Rows of an Hive does pretty well when well wrought, or a Wooden Machine made by a Couper, of the Dimenſion of the Mouth or Bottom of the Hive. Others take a Sieve or Riddle Rim, bend it till it comes to the exact Diameter of the Hive, and then ſix it; but, becauſe 'tis difficult to make an Hive ſtand upon it, a better Way is to put two Rims together, one within another, which makes a broader Foundation for the Hive to ſtand on, but the beſt I know is made thus: Take a Piece of Deal-board, of an Inch Thickneſs, ſufficient Length, and what Deepneſs you pleaſe; then take a Hand-ſaw, and at every half Inch Diſtance ſaw it almoſt thro', which will make it bend into a Circle of what Dimenſion you think fit, if your Eek is deep, there is no Fault in putting Croſs-ſticks into it, the better to fix the Combs.

167. When you have made your Eek ready, and have cut the Door-way in it, you muſt have an Aſſiſtant; one of you muſt liſt the Hive, and the other put the Eek under it. The beſt Time for this Operation is, when the Bees are throng at Work, then, the Hive being emptieſt, the fewer will be killed, and you will be in the leſs Danger of being hurt, for they are not then ſo injurious as when they are idle, and have their Guards ſet.

168. If

168. If you have given your Hive a large Eek, and the Weather proves to be ſo very bad, that they get it not near filled, then 'tis beſt to take it away, becauſe it would make them cold in Winter, and delays their ſwarming in the next Summer. The Way to do this, is, (after removing the Clay applied to fill up void Places, and make the Hive ſtand the firmer) to endeavour to get a Wier or ſtrong Pack-threed betwixt the Hive and the Eek; with either of theſe you may cut off the Combs, and carry off the Eek; but ſupport the Hive with Bits of Wood, half an Inch high, that the Combs left may be thereby kept from the Board or Stone.

169. I ſpoke in general of the killing of Drones; here I ſhall be more particular: Don't begin to kill them, till the Top-Swarm be gone off, leſt that protract the Flight of it; but immediately thereafter put a Crape or thin Cloth over your Hat, to keep it at a Diſtance from your Face, and yourſelf otherwiſe in Armour, the beſt Way you can; dreſſed for the Purpoſe, ſit down by the Side of an Hive, about Eleven o' Clock, the moſt ordinary Time of their coming out, and with a good ſharp Table-knife, you may kill at one Down ſitting more of them than would fill a *Scots* Chopin Stoup; this you may repeat for ſeveral Days ſucceſſively, from whence you may judge, whether it be an eaſy Matter for an Hive to maintain ſo many idle Deſtroyers, who, as far as I could ever diſcover, are good for nothing. Is it not plain, that an Hive that has caſt two or three Times liberally, muſt be in Hazard of being deſtroyed by theſe Gluttons, tho' in a ſtrong Hive their Maintainance is leſs perceptible?

170. When theſe idle Spend-thrifts are allowed to live till the End of *July*, or ſo, when the Working-bees give over hatching, fall ſeriouſly to the gathering of Honey, and then kill them of their own Accord, theſe Inconveniencies follow, 1*ſt*. They are all the while waſting and deſtroying the Honey. 2*dly*. The Working-bees ſpend their Time killing them; you'll frequently ſee

ſee them haling them out, and ſtinging ſome of them to Death; but as to take this Way with them all, would be a hard and tedious Taſk, conſidering the vaſt Numbers of them in an Hive; they therefore take another Method. The Bees go up among the Combs, and deſend the Honey till they ſtarve the Drones, which for a Time diverts them from gathering Honey; but an Hive, weak of Working-bees, is often of themſelves ſcarce able to overcome them; that this is the moſt common Way the Working-bees take of killing the Drones, will appear evident, if you make theſe following Obſervations.

171. *1ſt.* You'll find when an Hive is thus employed, it will be making very ſmall Progreſs in working, for few Bees remain for it, when ſo many are employed as aforeſaid; and one not experienced will be ſurpriſed to find this Hive doing ſo little, when others in the ſame Garden are ſo buſy. The Reaſon whereof is, that they either have not ſo much of this killing Work to do, or have more Bees to perform it.

172. *2d.* If you look into Galſs-hives, you'll obſerve the uppermoſt of the Boxes full of Drones, with few, if any Working-bees among them during all the Month of *June*, and the Beginning of *July*; but when the Time of Killing comes on, you'll ſee their Stations quite changed, the Drones all in the loweſt, and the Working-bees in the higheſt.

173. *3d.* If you lift up the Edge of a common Hive in the Month of *June*, or in the Beginning of *July*, you'll ſee only Working-bees, but if you raiſe it in the Killing-time aforementioned, you'll ſee the Drones lying on the Board or Stone with their Faces downward.

174. *4th.* When you kill them in *June*, you'll find the Knife cut them eaſily, and that they are ſo full of Honey, that the Working-bees throng about them, and ſuck it out of them, but when you kill them at the Time when the Bees themſelves kill them, they are dry and withered, and have no Honey in them. Nay, I'm of Opinion, that the Working-bees kill the Drones with greater

greater Eaſe than one would imagine, being perſwaded, that when they grip them by the Leg, or Root of the Wing, as you ſee is their Cuſtom, they have a Way of communicating Poiſon to them, which proves deadly, in the ſame Way that Spiders do to Flies.

175. From what is ſaid, 'tis plain, That if you have not killed your Drones until the Working-bees begin to do it; the beſt Way is to lift up the Edge of the Hive at Night, to ſweep out theſe Drones with any Thing convenient, to put down the Hive again, and to ſhut the Entry of it immediately, killing them as they ſeek to get in, which makes ſhort Work.

176. If you live in a Soil of Ground, dry and early, when the Flowers are gone, which will probably happen in the End of *July*, or Beginning of *Auguſt*, carry your Hives, eſpecially the weak ones, to a muiriſh Place, at leaſt a Mile's Diſtance, that the Bees may feed on the Flowers of the Heath, and late Meadows or Hain'd, *that is*, kept Graſs; and, when they have given over Work, bring them home again; or, if you live in a muiriſh Place, carry them in the Spring to a dry and early Soil, and bring them back when the Flowers are gone.

177. The *Natural Hiſtory*, I have mentioned, takes Notice, that it was the Practice in *Egypt*, *Greece*, *Italy*, the Country of *Juliers*, and that it is the Cuſtom of *France*, even at this very Time, to travel with Bees far and near, by Land and by Water. The Accounts are curious.

178. Here, one reading the Manuſcript, made a Remark, which I muſt allow to be juſt: You have raiſed your Readers Curioſity, ſaid he, but taken no Pains to gratify it; and beſides the Story, (for I have read it) is not only entertaining, but may be uſeful; borrow it, continued he, for he has it from others, and whoſoever writes next upon the Subject, will poſſibly take ſome Thing from you. My Objection was, that the Account was long, and that I could not abridge it, without loſing ſome Part of the Meaning of the Author, and the Beau-

ty

ty of his Expreſſions; Then take it all, replied he, you'll find it the beſt Way: So hoping you'll be of this his Opinion, you have the Story as follows.

179. *Eugen.* "Spite of the Ignorance and Ruſticity "which have got Poſſeſſion of *Egypt*, there remain in "it ſeveral Foot-ſteps of the Induſtry and Skill of the "ancient *Egyptians*. One of their moſt admirable Con"trivances is, their ſending annually, the Bees into di"diſtant Countries, in order to get Suſtenance, at a "Time when they could not find any at home, and af"terwards to bring them back, as the Shepherds ſhould "travel with their Sheep, and make them feed as they "went along. The Inhabitants of lower *Egypt* obſerv"ed anciently, that all the Fruits of the Earth ripen"ed ſooner in upper *Egypt*, than in their Parts, which "made a Difference of above ſix Weeks, between the "two Countries. Hence they were prompted to make "their Bees, if poſſible, reap an Advantage from this "Interval; or, in other Words, to procure them Food "ſix Weeks ſooner, than they would have done in their "native Place. The Expedient made uſe of by them, "for the Purpoſe we are ſpeaking of, is employed in this "Age. About the End of *October*, all ſuch Inhabitants "of Lower *Egypt* as poſſeſs Hives, embark them on the "*Nile*, and convey them upon that River, quite to up"per *Egypt*, they obſerving to arrive thither at the Time "when, the Inundation withdrawing, the Lands have been "ſowed, and the Flowers begun to bud." *The Hives having come to this Part of* Egypt, *are there placed pyramidically in Boats prepared for that Purpoſe, after being marked and numbred by the ſeveral Owners who ſet them there. In this Place the Bees feed in the Field during ſome Days. Afterwards when 'tis to be ſuppoſed they have got in all the Honey and Wax that could be met with within two or three Leagues round, their Conductors convey them in the ſame Boats, two or three Leagues lower, and there leave the laborious Inſects ſo long Time, as is neceſſary for them to collect all the Riches on the Spot in queſtion.* "Thus the nearer they come to the Place of their Abode,

"the

" the Earth forwards its Productions, and the Places " flouriſh in Proportion; ſo that we may then ſay of " the Bees, with ſomething more Truth than we ob- " ſerve with regard to the Ladies; that Flowers ſprung " up under their Feet." *In fine, about the Beginning of* February, *after having travelled thro' the whole Length of* Egypt (*gathering all the rich Produce of theſe delightful Banks of the* Nile) *they arrive at the Mouth of that River towards the Ocean; whence they ſet out and return to their reſpective Habitations. For Care is taken, to ſet down exactly, in a Roll or Regiſter, every Diſtrict from whence the Hives ſet out in the Beginning of the Seaſon, their Numbers, and the Names of the particular Perſons who ſent them; as likewiſe the Mark or Number of the Boats, in which they were placed, according to their ſeveral Habitations* *.

179. *Clar.* " It muſt be a ſingular Spectacle to a " Traveller, to view whole Fleets of Bees, ſailing pom- " pouſly on this noble River. *Cleopatra*'s Fleet which " went to meet *Mark Anthony* was more gaudy indeed, " but then it did not reflect ſo much Honour on the " Underſtanding of the *Egyptians*. But I have heard " of ſomething ſtill more ingenious, with regard to our " Inſects; if we may credit what we are told in *Spectacle* " *de la Nature* †. 'Tis there declared, that the *Egyp-* " *tians* had found the Secret of giving an Education to " Bees, ſuch as few Animals are capable of acquiring: " That they had Shepherds, who led them to Paſture, " in the ſame Manner as a Shepherd leads his Flock; " that the Bees more tractable than the laſt mentioned " Animals were prompted merely by a Whiſtle, to " leave their Hives, or return to them; to go from one " Meadow to another; to fly to the Banks of a Rivu- " let; in ſhort to follow their Leader, from Village to " Village, whither ſoever he might think proper.

* *Deſcription of* Egypt, *Tom.* XI. *Page* 24.

† *Tom.* III. *Page* 37. *in our* Engliſh *Tranſlation of this excellent Work, 'tis Tom.* III. *Page* 23. *of the* 8*vo. Edition.*

180. *Eugen.* "I also have heard this Relation, or ra
"ther little Romance; and I remember that the Author
"quotes, to justify his Assertion, a Passage from the
"Prophet *Isaiah* *, and another from St. *Cyril*. How-
"ever, notwithstanding these venerable Authorities, I
"believe we may doubt the Truth of this Assertion;
"and apply this Whistle to Sailors concerning the Ma-
"nagement of Boats; I mean, that it was used about
"sailing; and other Ways to direct the *Egyptian* Mari-
"ners, rather than govern the Bees.

181. *Clar.* "But, *Eugenio*, if *Isaiah* declares the
"very Words mentioned in *Spectacle de la Nature*,
"methinks we cannot but give Credit to them. Do
"you consider that 'tis a sacred Writer who speaks?

182. *Eugen.* "I bear no less Reverence to this divine
"Book than St. *Jerom* did; and will observe to you
"(after him) that many Things are told in Scripture,
"comformably to the Opinion which prevailed in that
"Age; and not to the most exact Truth †. The sa-
"cred Writers express themselves sometimes suitable
"to the Notions of the Vulgar, rather than agreeably
"to the Accuracy of Physicks; and for this Reason,
"because human Sciences are of little Consequence
"with regard to the Knowledge of Justification and
"Sanctification; which is the only End proposed by
"the Almighty in giving us the Scriptures. Bees, in
"our Age, would not be capable of receiving such an
"Education; and 'tis more than probable, that those
"of past Times were not better qualified to learn, than
"our present Insects. But to resume our Subject. *E-*
"*gypt* is not the only Country in which our Insects are
"made to travel. *Alexander de Montfort* tells us that
"the *Italians*, who live near the Banks of the *Po*, treat
"the Bees in much the same Manner as the *Egyptians*;
"that they load Boats with Hives, and convey them

* See *Isaiah* v. 26. and vii. 18.

† *Juxta opinionem Illius temporis, & non Juxta quod rei veritas continebat. S. Hieron in L.* 28.

" to the Neighbourhood of the Mountains of *Piedmont*; " that, in Proportion as the Bees gather in their Harveſt, the Boats, by growing heavier, ſink the deeper " into the Water; and that the Water-men determine " from hence, when their Veſſels are loaded ſufficiently; " and that 'tis Time to carry them back to the Place " whence they came.

183. *Clar.* " This proves to me, how exceedingly " advantageous it is for Perſons to live in the Neighbourhood of a great River, when their Fields are not " very abundant in Flowers, or ſufficient to ſupport our Inſects during every Seaſon. I conceive that Bees, by taking " a little Voyage upon a River, and enjoying the Spring " of a dry Country, with the Autumn of a fat ſhady " Soil, may thus be ſupported the Year round. But in " order to do this, the Owners of Hives muſt live near " a navigable River, otherwiſe what I juſt now deſcribed " would be defeated; and you know that many Places " have not ſuch an advantage.

184. *Eugen.* " This Defect may be ſupplied by Land-" carriage. *Columella* informs us, That the *Greeks* conſtantly conveyed every Year Bees, from *Achaia* to " *Attica*; and this becauſe, that at the Time that the " Flowers in *Achaia* are gone, thoſe of *Attica* began to " blow. *Montfort* relates, That the People of the " Country of *Juliers* uſed the ſame Practice; and that, " at a certain Seaſon of the Year, they carried Bees to " the Foot of Mountains covered with Thyme, and that " of the wild Kind. I, indeed, borrow theſe Inſtances " from remote Times and foreign Countries; but as " People are apt to ſubſtract many Things from theſe " Relations; I muſt give you an Example of what is " done among ourſelves, in the Centre of *France*, and " of which you yourſelf may be Eye-witneſs. One of " thoſe Men born for the Improvement of Arts, and " whoſe Name deſerves to be tranſmitted to Poſterity, " Mr. *Proutaut* makes his Bees travel like the *Greeks* " of *Achaia*. This ingenious Artiſt has ſet up a Manufacture, for whitening Wax, in the Dioceſe of *Or-*

" *leans*,

" leans, and there keeps a great Number of Hives. " This Spot is one of those in which Flowers become " rare or scarce very soon; and where few or none are " seen after the Corn is ripened. He then sends his " Bees to *Beauce*, or *Le Gâtinois*, in case it has rain- " ed in those Parts. This Journey is about Twenty " Miles, which he makes them take. But, if he con- " cludes that the Bees could not meet, in either of these " Countries, wherewith to employ themselves advan- " tageously, he has then carried them into *Sologne*, a- " bout the Beginning of *August*, as knowing that they " there will meet with a great many Fields of Buck-wheat " in Flower, which will continue so till about the End " of *September*.

185. *Clar.* " I can easily conceive, that Hives may " be carried to a great Distance in Boats. This Car- " riage is gentle, and can hurt Bees very little. But " then, methinks, the conveying of them by Land, " must be attended with many Difficulties. In what " Manner does your Industrious Artist act on this Oc- " casion? I presume that he is not so polite as to con- " vey our Insects in a Coach or Litter.

" 186. *Eugen.* The antient Historians had not ac- " quainted him with the Method, by which the *Greeks* " used to send away their Bees by Land: But here fol- " lows his Contrivance, which he practises with Success. " The first Care is, to examine those Hives, some of " whose Honey-combs might be broken or separated, by " the jolting of the Vehicle; they're made fast one to the " other, and against the Partitions of the Hive, by means " of small Sticks, which may be disposed differently, as " Occasion shall show. This being done, every Hive is " set upon a Packing-Cloth, or something like it, the " Threeds of which are very wide: Then they turn up " the Sides of this Cloth, and lay them on the Out-side " of each Hive; and tie them together with a Piece of " small Pack-threed, observing to wind it several Times " round; they afterwards place in a Cart, built for that " Purpose, as many Hives as it will hold. The Hives

" are

" are ſet two and two the Length of the Cart. Over
" theſe others are placed, which make, as it were, a
" ſecond Lay or Bed of Hives. Theſe muſt be always
" put topſy-turvy; 'tis for the Sake of the Honey-combs,
" and to fix them the better, that the Hives are diſpoſed
" after this manner; for ſuch as have no Honey-combs,
" or very ſmall ones, are placed in their natural Situa-
" tion: Care muſt be taken in this Stowage, not to let
" one Hive ſtop up another; it being eſſentially neceſ-
" ſary for Bees to have Air, and 'tis for this Reaſon that
" they are wrapped up in a coarſe Cloth, the Threeds
" of which were wove very wide, in order that the Air
" may have a free Paſſage, and qualify the violent Heat
" which theſe Inſects raiſe in their Hives, eſpecially,
" when they move about very tumultuouſly, as often
" happens in theſe Carts. Thoſe uſed for this Purpoſe,
" at *Yevre*, hold from thirty to forty eight Hives. As
" ſoon as all are thus ſtowed, the Caravans ſet out. If
" the Seaſon is ſultry, they travel only in the Night;
" but, in cool Days they make a proper Advantage of
" them. You'll imagine, that they don't ride Poſt.
" The Horſes muſt not be permitted even to trot; they
" are led ſlowly, and through the ſmootheſt Roads. If a-
" ny Hives are void of Honey-combs; or have not ſuf-
" ficient to ſupport the Bees during their Journey, which
" is more than of one Day, they are made to ſtay in the
" Place where they happen to be. The Sort of Hives we
" are ſpeaking of, are taken out of the Cart; and are ſet
" upon the Ground; and after removing the Pack-cloth,
" an Aperture is made at the Bottom of every Hive,
" by which the Bees iſſue forth, in order to procure
" themſelves Proviſions abroad. The firſt Field they
" come to ſerves as an Inn to them. In the Evening,
" as ſoon as they are all returned, the Hives are ſhut
" up, and being placed again in the Cart, they proceed
" in their Journey. When the Caravan is arrived at
" the Journey's End, the Baskets are ſet up and down
" in the Gardens, or in Fields adjacent to the Houſes

" of

" of different *Peaſants*, who for a very ſmall Reward " undertake to look after them."

187. 'Tis now Time to think what Hives to keep, and what to kill; you know I have been all along adviſing you to preſerve the beſt, as thoſe that will turn to the beſt Account next Year. When you have killed the worſt, in early Places in *Auguſt*, in later in *September*, and in general when they have given over Work, you ſhould immediately take Care of the Preſervation of the Remainder.

188. Whenever you find your Bees giving over Work, begin to leſſen the Entries to their Hives by Degrees. This is a very neceſſary Thing in this Time of the Year; for if the Weather is fine, and the Proviſion ſcarce, the Stronger, as I have ſaid, will plunder the Weaker: To remedy which in the Beginning, the ſtraitening of the Doors is the beſt Expedient.

189. If you incline to keep an Hive that you ſuſpect to be weak, this is the proper Seaſon for feeding it, which you may do with the Dreg of the Honey of thoſe you have killed, obſerving the Directions I gave concerning this Matter for the Spring; only you are not now to give them a Doſe, and then to wait to know by the Weather, if it is neceſſary to give them any more; but you are to conſider what they will want, and to give it in Doſes, until they have got all you deſign; yet if at any Time you find Honey left over Night, you muſt remove it next Morning, and give them no more for a Night or two.

190. If you find it neceſſary to remove the Eeks you put to your Hives, this is the Time for it; if to continue them, to plaiſter up the Joinings, and all around the Mouth of every Hive, to keep the Rain from getting in.

191. When theſe Things are done, your Hives all very dry, and the Weather yet good, you muſt fit them for the Winter by putting Covers over them, or removing them to your Bee-houſe, to be hereafter deſcribed.

192. I have

192. I have now brought my young Practitioner thro' the whole Year with his Bees, have endeavoured to give him ſuch Directions as are neceſſary for every Seaſon, and when I have advanced any Thing that I have not fully experienced, I have told him ſo, in Hopes that others may make further Diſcoveries. Directions are indeed neceſſary for a young Beginner, but Application is the Life of all Buſineſs, the more he views and conſiders theſe wonderful and highly profitable Creatures, he will the ſooner learn the Husbandry of them, and become the ſooner and the better qualified to give Directions to others concerning them.

193. To ſuch as may be afraid to attempt this Part of Husbandry, by ſo many and ſo different Rules and Directions, I ſay,

194. 1ſt, There is no ſafe Way of coming to the Knowledge of any Thing of this Sort, without the Help of a great many Directions and Cautions: When you are reducing them to Practice, you will, on Occaſion, find Uſe for every one of them, and poſſibly wiſh for more: It is, without doubt, the Fault of the other Books upon this Subject, that they ſpend too much of the Reader's Time, being ſwelled with the ſpeculative Part, which enhances their Price, and give too few, and too general Directions; both which Errors I have endeavoured to avoid in this ſmall Treatiſe, that it may be the more generally uſeful, and become the Property of the meaner Sort, on a ſmall Expence.

195. 2*d*, Tho' there are many ſuppoſed Caſes and Objections, which may never fall in your Way, anſwered here; yet when any Thing extraordinary befals you in your Management, and perplexes you, you will then be glad of Directions concerning them. You know 'tis eaſy to manage Husbandry of any Kind, when the Seaſon and Circumſtances combine to favour our Deſign; but when 'tis otherwiſe, and Things begin to go croſs to our Wiſhes, then the Skill of the Husbandman is known by applying Rules ſuitable to the Occurrences that happen.

195. So

196. So far am I from thinking, that this Husbandry can be made too plain, or that 'tis a Fault to multiply the Number of different Directions concerning it, that I ſhall for further Inſtruction to my Readers, and partly to ſatisfy the more curious Part of them, add a few general Queſtions and Anſwers, after I have let them know my Opinion concerning the Boxes, that have been of late ſo much commended, and are called by the Name of Colonies.

197. I own the Invention is curious, and that the Deſign to ſhew a Way how to ſhare of the Fruit of the Bees Labours with them, without putting them to Death for it, is ſo far inexceptionable, that I like the Humanity of it, and wiſh I could find it as profitable as it is merciful. The Favourers of this Invention alledge that when there is ſo great a Number of them in one Family, they turn to much better Account, than in the ordinary Way: I ſhall endeavour to ſhew, that the Ends they propoſe are not obtained by their Method.

198. *1ſt.* I'm afraid 'tis found by Experience, that Bees, eſpecially in this Country can do little more than maintain themſelves thro' the Year, even in the beſt Seaſons. How then can you expect any great Share of their Honey without killing them? 'Tis for this Reaſon that I have adviſed my young Beginner to keep always his richeſt Hives over Year, becauſe ſome Seaſons will put the beſt of them to a Pinch.

199, *2d.* The Method ſeems contrary to their Way of doing; for they lay their Eggs and hatch their Young in the middle Parts of the Combs and Hives, whereby they get them the better ſurrounded and defended againſt all Hazards and Inconveniencies, and by the greater Heat there, than more outwardly, they get them the ſooner and ſafer hatched; yet I ſhall not deny, that in the warm Months of *June* and *July*, Mr. WARDER may have ſeen ſome of the Brood in Cells at the Windows; but, I think every one of the Family ſhould know beſt what Part to act when they are all in one Houſe together; whereas when they are obliged to perform this Office in

two

two or three diſtinct Boxes, they are not capable to execute it ſo well.

200. *3d.* 'Tis difficult, and ſometimes impoſſible, to keep them from ſwarming or caſting.

201. *4th.* The Honey you get this Way is both very little in Quantity, and very bad in Quality, being full of young Bees, Bee-bread, and ſuch Stuff as you commonly find in old Hives.

202. *5th.* Seeing it is evident, that the Thriving and Succeſs of the whole depends on the Welfare of a ſingle Bee, the Sovereign, I humbly think 'tis too great a Riſk to hazard a numerous Colony, and ſo great a Stock upon his ſingle Life; beſides, it ſeems to be putting too much Generation-work upon him: Tho' my Opinion is, that the Product of Bees is much better, in Proportion, when there is a greater Number of them together, than when there are but few, yet I do not ſay, but we may exceed, eſpecially when they are diſpoſed in three diſtinct Families. Then the Sovereign can neither have ſo diſtinct Knowledge of what his Subjects are doing, nor can they be ſo eaſily ſatisfied, as otherwiſe, of his Welfare; which Uneaſineſs on both Sides will, no doubt, give them great Diſquiet, and oblige them to travel frequently from one of theſe Apartments to another, which muſt exceedingly retard their Work.

203. I might advance ſeveral other Arguments againſt this Way of Colonies, ſuch as the Difficulty of getting the Bees to ſeparate from the Honey, when you take away a Box from them, which is not ſo eaſily done as the Favourers of that Project would make you believe: But I ſuppoſe I have ſaid enough, to diſpoſe you to think twice, before you hazard much upon it, and theſe who are of another Opinion may try the Experiment when they pleaſe; I wiſh thoſe, who have done it, have fairly computed, and fully conſidered the Difference of the two Ways before they recommended Colonies. I come now to my general Queſtions, which I told you were partly curious, and partly uſeful.

204. *1ſt.* Whether are they young or old Bees which make up young Hives?

205. *Anſw.* A young Hive conſiſts of a Mixture of both, and 'tis beſt for the common Good, when the Compoſition it pretty equal; for when too many young Bees come off to the young Hive, then the old Hive conſiſts almoſt wholly of old ones, and then in the End of *July*, when the old Bees die, you will ſometimes obſerve an old Hive, that looked very promiſing and thriving after Swarming, ſuddenly come almoſt to nothing.

206. On the other Hand, you will find a young Swarm in a hopeful Way, of making a ſtrong Hive for ſtanding out the Winter, which yet will, by and by, fruſtrate your Expectation, when the old Bees die; for thereby their Number is ſo impaired, that they are not able to do much good for that Seaſon.

207. Thus it is plain, that when a Swarm conſiſts of near an equal Number of young and old Bees, both the old Hive and itſelf bids faireſt to thrive.

208. *2d.* How long do Bees live?

209. *Anſw.* The Bees that are hatched in the Spring, live until next Year about the End of *July*. Hence it is, that tho' your Hive be very throng, and appear daily increaſing, yet when this Time of Mortality comes, you will find them conſiderably decreaſe.

210. The Reaſon why they are more ſenſibly obſerved to die at that, than any other Time, is, Becauſe the greateſt Part of them are hatched in the Spring, and ſo they come to die in greateſt Numbers in that Seaſon: The reſt of the Summer their Hatching is more gradual, and ſo their Death is not ſo perceptible.

211. What was advanced near the Beginning of this Treatiſe concerning an Hive of Bees, who have loſt their King in Winter, or Spring, their dwindling to nothing by the End of *July*, is a Proof that they are no longer lived; beſides, if you view your Hive in the Beginning of *July*, you'll eaſily perceive great Numbers of them with Symptoms of old Age about them, having the Down worn from off their Back, and their Wings ragged;

ged; but if you obſerve them in *Auguſt*, after the dying Time is over, you'll ſee no ſuch Marks of old Age about them.

212. If my Readers would be further ſatisfied concerning this Matter, they may look what Dr. WARDER ſays upon the Head,.

213. 3*d*. Whether is it beſt to keep an old or a young Hive, and how long may an Hive be kept?

214. *Anſw*. I have already given you a general Direction to keep the ſtrongeſt, whether old or young, and ſhall not here reſume the Reaſons; but when the Queſtion is betwixt a young and an old Hive of equal Weight; then I anſwer, 'tis beſt to keep the old one, and that for theſe Reaſons. 1*ſt*. The young one will afford you the beſt Honey, by very far. 2*dly*. The old Hive will yield you as good a Product, which I think will determine you to keep it.

215. As to the ſecond Part of the Queſtion, I anſwer, That I do not know from Experience how long an Hive may be kept; but I am of Opinion, that it may be preſerved a long Time; for 'tis plain from what has been ſaid, That it does not labour under the Inconveniency generally believed, that the Bees grow old and lazy; it being made appear, that they are as young in an old Hive as in a young one.

216. Thus you ſee, that, by keeping old Hives, you have this Advantage, that you get Virgin-honey for many Years together, which will give you more Profit if you ſell it, or Pleaſure if you eat it, than the Honey of the old Hives would do, and yet the old Hives will ſerve full as well for Propagation; but yet, if the ſame Hive is kept for many Years, the Combs will become black and thick, with the Skins left by the young Brood, the Straw of the Hive will be apt to rot and become muſty, and theſe muſt prove inconvenient, offenſive, and infectious to the Bees; as alſo the Sticks within the Hive will moſt probably fail, and become inſufficient for ſupporting the Weight they have to bear.

217. 4*th*. What Weather is beſt for Bees?

218. *Anſw*.

218. *Answ.* Calm warm Weather with ſoft Showers now and then: Wind is very deſtructive to them, not only by retarding them in their Work, but it even beats them againſt Walls and Trees, *&c.* and kills many of them: Cold Weather pinches them ſo that they cannot go abroad, and when they do, they find not the Flowers ſo rich of Matter, for Honey or Wax, as when the warm Beams of the Sun play upon them, and exhale that Moiſture which is fit for their Purpoſe.

219. Soft Showers likewiſe contribute much to their Advantantage, eſpecially in Soils that are naturally dry and ſandy. There in Drought the Flowers grow ſo dry and parched, that their Moiſture is quite dried up, the Bees find little Proviſion abroad, and ſo make ſmall Progreſs; but where the Soil is naturally moiſt, bad Effects by Drought are but rarely felt. Sudden violent Showers of Rain, but eſpecially Hail, is very prejudicial to them; for when a warm Blink of Sun-ſhine invites them abroad, and then a plump Shower ſurpriſes them, multitudes of them will thereby periſh, eſpecially if it is cold, or of Continuance; but if it blows ſoon over, and the Sun beats very warm again, this will tend greatly to recover them.

220. *5th.* What Fields and Flowers yield them moſt, and beſt Matter for Honey?

221. *Anſw.* There are different Flowers in the different Seaſons, that afford them Plenty for both Honey and Work, ſuch as, early in the Spring, the Bloſſoms of Gooſe-berrie Buſhes, Sallows, Roſe-mary, the Plane-tree and Whins; theſe, as far as I remember, are of the greateſt Uſe to them, and afford them the moſt of their Food, and work early in the Year, tho' there are others that cannot be eaſily got in Plenty, as Crocuſes, black Hellibore, Imperial Crown, Scurvy Graſs, Wall Jelliflowers, and a great many more, all Flowering before the Middle of *May*.

222. The principal ones that ſucceed, are, the wild Muſtard, which is the Chief, the Apple, Pear, and other Fruit-trees, white Clover, Woad, Poppies, Garden Muſtard,

ſtard, Thyme, Sage, Hyſop, Kail or Coleworts of all Kinds, Turnips and Broom.

223. Then in the End of Summer and Beginning of Harveſt, the principal ones are Heath, Ragweed, Flax, Hemp, Lime-tree, and a great many Flowers in late Meadow-ground, and hained or kept Graſs. It is to be obſerved, that tho' moſt of theſe Flowers yield Work, as the Flowers of Furz, Broom and Poppies, yet ſome of them afford only Honey, ſuch as Clover, Gooſe-berries and Thyme.

224. From what has been ſaid, 'tis evident, that the Fields that abound moſt with theſe Flowers, are the beſt for Bees, and thus it is, That ſome Places of our Country are beſt for them in the Beginning of the Seaſon, and other Places in the End of it; for Inſtance, The Sea-coaſt, generally ſpeaking, affords them the earlieſt Flowers in greateſt Abundance; the hilly Grounds and Muirlands the lateſt; becauſe there the Heath and Meadows are moſt plenteous.

225. For this Reaſon, if any will give themſelves the Trouble, to remove Hives from the Sea-coaſt in the End of *July*, when the Flowers there are gone, to any other Place where are uncut Meadows or Heath, or both, they will find a great Advantage by it.

226. This a Gentleman, even of our own Country, has practiſed with very good Succeſs, and has found, that when his Bees had almoſt given quite over working, becauſe the Flowers were gone; upon his tranſporting them to Meadows or Heath-grounds, they have ſet to Work again as briſkly as ever.

227. For this Reaſon, when he lived on the Sea-coaſt, he uſed to carry his Top-ſwarms, the very Night they were hived, to ſome Place convenient for Muirs and Meadows, where he allowed them to ſtand until the Seaſon of their working was over.

228. He had two Advantages by removing the young Swarms rather than the old Hives. *1ſt*. They were eaſieſt carried, being lighter. *2dly*. They were not in Hazard of ſeeking the Way home again, which the old

old ones do, if they are not removed to a due Diſtance, which leads me to the ſixth Queſtion.

229. 6th, To what Diſtance will Bees fly for Food?

230. *Anſw.* They commonly fly to a Mile's Diſtance, and ſometimes two, as thoſe who live a Mile from Heath, may obſerve, by the Work their Bees bring home upon their Thighs, when the Heath is bloſſomed. You may know pretty well, what Flowers are blown in the Field, tho' you go not out of your Garden, for the wild Muſtard yields Work of a Colour, betwixt yellow and green, and the Duſt of the Flower paints them, eſpecially their Forehead, the ſame Colour: Broom-bloſſoms yield bright yellow Work, and dyes their whole Body that Colour: The Heath affords Work of a faintiſh Green, or Aſh-colour, but does not dye their Bodies.

231. Bees have been found in Heaths, at two Miles Diſtance from any Hive, tho' rarely, yet they can make little Progreſs, if they are obliged to travel a full Mile, and few Bees goes ſo far. Theſe that go cannot make many Journeys in a Day, the Diſtance being ſo great, and they are much expoſed to Accidents when ſo far from Home.

232. The main Deſign of this Queſtion being to know, to what Diſtance 'tis proper to remove Bees, either to prevent Fighting, as you was adviſed when treating upon that Head, or for getting more Proviſions againſt Winter, I ſhall ſpeak thereof as the Gentleman, juſt now mentioned, ſays he has Experienced.

233 The firſt Time he removed Bees, having carried them only half a Mile, he found that a great many of them returned, gathered in Cluſters upon the Stakes where the Board ſtood before the Removal, and when they could find no Lodging-place, ſome of them made their Way back to their own Hives, but the reſt, in a humble Way, begged Quarters from the Hives left in the Garden unremoved.

234. Next Seaſon he removed them a full Mile, and found, that ſome of them ſtill returned, but not in ſuch Numbers, as much to weaken the Hive or Hives they left.

left. They hovered about the Place from whence they were removed, and frequently reſorted to the reſt of the Hives, looking for their own Abode, but weary of their fruitleſs Endeavours, they took Lodging where they were made moſt Welcome.

135. The following Seaſon, he tried them at the Diſtance of a Mile and a half, and found a few return even from thence.

236. From theſe Obſervations he concluded, that they may with Safety be removed, if you take them a full Mile off, and that you will find Advantage by taking them further; for if you pleaſe to take the Trouble, to weigh two of your Hives, and remove one of them as directed, you will find that which was tranſported much heavier, in Proportion, than the other upon weighing them again. Now I humbly think that this Matter of the removing of Bees, has been pretty fully treated of in this and the former Pages.

237. *7th.* What Flowers yield beſt Honey?

238. *Anſw.* I ſhall not pretend to give my Reader full Satisfaction in this Matter, becauſe I neither know what is the beſt Honey, thoſe pretending Skill in that Affair being divided in their Opinions concerning it; nor can I tell what Sort of Honey every particular Flower affords; but I ſhall endeavour to inform, what Honey gives the greateſt Price in this Country, and what Flowers contribute moſt to the producing of it.

239. I told you before that Bean Bloſſoms, wild Muſtard, Meadows, hained or kept Graſs, and Heath, afford the moſt of our Honey in this Country. According as theſe are plenteous or ſcarce, ſo will the Colour of the Honey be found to be; that which is whiteſt is thought beſt, the further it recedes from that Colour, it is eſteemed the worſe.

240. There are two Sorts of wild Muſtard, the one commonly called *Skeldocks*, the other *Runches*. Some Fields will have Plenty of the one, and none of the other, *& vice verſa*. Skeldocks yield Yellow, Runches very white Honey, Meadows make white Honey, Heath reddiſh

reddiſh. Theſe Fields therefore, where only Runches abound among the Corn, and where no Heath is near, will produce very white Honey. If there is a Mixture of either the Heath or the Skeldocks, the Honey will be yellowiſh, but not ſo yellow as if there were no Runches.

241. In Places where both Runches and Heath abound, you may eaſily in the End of the Seaſon diſcern in a fine Honey-comb, the upper Part of it of a white Colour, the lower, which was laſt filled, and from the Heath, of a reddiſh Colour.

242. In Places where there were few Skeldocks, and not much Heath, but a great Deal of Meadow and kept Graſs, I have ſeen the Honey of a fine beautiful Colour betwixt green and whitiſh Yellow; and ſo in different Parts, the Colour alters as theſe Flowers prevail.

243. I remember no other Flower, that ſo much abounds, as to determine the Colour, except the Flower of the Ragweed, which in ſome Places is very plenteous, and may give it a yellow Colour, tho' neither Skeldocks nor Heath are near.

244. I ſhall here take Occaſion to ſpeak of the Conſiſtence of Honey, that which is hard, is moſt valued, *cæteris paribus*, and juſtly ſo; let this be put to the Trial, and you will find that the thick, will ſweeten a great Deal further than the ſame Quantity of the thin.

245. There are two Things which have Influence on the Conſiſtence of Honey. 1*ſt*. The Weather. 2*dly*. The Seaſon of the Year. If the Weather is dry, the Honey will be of a harder Conſiſtence, and, on the contrary, when 'tis rainy, it abounds with watery Parts, which the Bees ſuck up with the Honey, and ſo it is ſofter.

246. Again, the Honey which is gathered early in the Seaſon, is harder than that which is gathered in the End of it; becauſe the Heat, both of the Sun and the Bees themſelves, has more Time to exhale the Water out of it, and ſo leave it harder than the other made thereafter.

247. Hence

247. Hence it is, that the Honey of old Hives is harder than of young ones; for you know much of their Honey is gathered early, even before the first Swarm goes off, which therefore cannot miss to be thicker than the Honey of Hives of a short ſtanding; ſo if there were not ſeveral other Conſiderations to caſt the Balance, the Honey of old Hives would be beſt.

248. *Queſt.* 8th. Can a Field be over-ſtock'd with Bees?

249. *Anſw.* No doubt but it can, tho' this happens more rarely than People imagine. You may eaſily believe, that the Flowers of a Field conſiſting of a Circle of two Miles Diameter, will not be ſoon exhauſted, or elſe it is a very barren Soil.

250. I have known, in a little Sea-coaſt Town, upwards of Fifty Hives all in a thriving Condition at one Time; now, how many may another be ſuppoſed to maintain, that has not the Sea to take up one Side of it? If this is duly conſidered, you need be in no great Fear of over-ſtocking your Ground. I ſay no more upon this Head.

251. *Queſt.* 9th. Will an Hive caſt a Top-ſwarm before it is full of Bees?

252. I anſwer in the Negative, never having obſerved a Top-ſwarm go off till the Hive was quite full, tho' every Body knows that it will caſt a ſecond, or third, when it is very far from being full. If it be here queſtioned, why I aſſerted that Bees cannot be kept from ſwarming, when they may be ſo eaſily ſupplied with an empty Box, before the reſt are quite full? I anſwer, That the giving them a new Box is not ſo properly an Enlargement of their Houſe, as adding another Houſe to their former one, and is much the ſame Thing as if you would artfully join an empty Hive, to the Entry of that one ready to caſt, with a Deſign to prevent the Caſting, which will not hinder it, for they will only uſe it as a Veſſel to convey them to their proper Apartment.

253. They like, as I ſaid before, to live together, till, being pinched for Room, they ſend off a young Fa-

mily to provide a Lodging for themſelves. But if you enlarge that Apartment after the uſual Manner, they will not Hive till they fill it up again; yea, tho' you continue to enlarge it from Time to Time, till the End of the Year.

254. *Queſt.* 10th. Which is the Way of the Formation and Progreſs of Bees?

255. *Anſw.* The Bee lays an Egg in the Bottom of the Cell, which ſoon comes to appear in the Form of a very ſmall Worm, lying in the Bottom of the Cell, from which it advances gradually with its Head towards the Mouth thereof, and by Degrees takes the Shape of the Bee, being all this While of a white Colour, and fed by the old ones, much in the ſame Manner that Pigeons and ſmall Field-birds feed their Young, till it arrives at a certain Degree of Ripeneſs. Then it is ſealed up in the Cell, in the ſame Way the Bees do the Honey, for two or three Days, or longer, in which Time it takes the Colour of a Bee, and then breaks thro', and goes abroad a ripe full-grown Bee. Any Body who wants a further Deſcription of this, may conſult Dr. WARDER.

256. *Queſt.* 11th. What is the Uſe of the Bee-bread, and how prepared for that Uſe?

257. *Anſw.* The Bee-bread is for nouriſhing the young Bees, and is thus prepared: The old Bees put it in the Cells, and add a convenient Proportion of Water and Honey to it, which being wrought up to a certain Degree of Fermentation, it becomes proper Food for the Young, and is given them in the Way ſet forth in the Anſwer to the former Queſtion; but, as it is evident, that a great many young Bees are hatched ſo early in the Spring, that they cannot get Bee-bread of the ſame Seaſon, their Proviſion muſt certainly be, by a Store laid up in the End of the Year preceeding, which is done by half filling a great many of the Cells with it, and filling them up with Honey, which preſerves it freſh and fit for Uſe. This they take and mix in the Manner juſt deſcribed,

deſcribed, which feeds the Young, till Proviſion can be found abroad.

258. *Queſt.* 12th. What Size of Hives is beſt?

259. *Anſw.* You have been told that the ordinary Size in our Country, contains about a Peck and three Lippies of Barley *Linlithgow* Meaſure, and long Experience hath taught, that any Size much below or above that, does not anſwer ſo well; for when they are very ſmall, 'tis leſs worth while to attend them, and when very big, they do not produce in Proportion to their Bigneſs: Beſides, there is too great a Hazard run upon the Life of a ſingle Bee (the King) as was obſerved in one of the Objections againſt Boxes.

260. *Queſt.* 13th. In what Time does a Bee come from an Egg to full Maturity?

261. *Anſw.* About ſeventeen Days; for I have known a firſt Hive, in warm Weather, caſt a Swarm in that Time, which is a Proof of it.

262. *Queſt.* 14th. What Number of Bees may be ſuppoſed to be in an Hive?

263. *Anſw.* I reckon, that in an Hive of the ordinary Dimenſion aforeſaid, there will be about twelve Thouſand Bees; but before Caſting, I doubt not, but there will be double that Number: If you'll conſider, how long every Bee muſt take to bring in her Loading, and yet what vaſt Numbers of them are always going in and out at the Entry to the Hive, you'll eaſily be induced to think ſo. The Way to number them is: After they are killed, to fill any ſmall Veſſel full of them, try how many it contains, and then try how often the whole fills it.

264. *Queſt.* 15th. What is the Bee-bread, and whereof are Combs made?

265. In Anſwer to theſe Queſtions, I ſhall only give you the Opinion of others: As they do not agree, I leave you to form a Judgment thereof to yourſelf, from their Opinions and your own Obſervations.

266. Mr. *Chalmers* in his Dictionary, ſays, "That "Wax is not the Excrement of the laborious Bee, as

"the

" the Ancients, and after them many of the Moderns " have imagined. 'Tis properly a Juice exuding out of " the Leaves of Plants, and adhering to the Surface " thereof, from which it is ſcraped off by the Bees with " their rough Thighs, to build their Cells withal; *Boer-* " *haave*, ſays he, is of this Opinion.

267. " Again, ſays Mr. *Chalmers*, The Wax being " a hard Subſtance, is gathered only by the Fore-legs " and Chaps, conveyed thence to the Middle-legs, and " thence to the Middle-joints of the Hind-legs, where " there is a ſmall Cavity, like the Bowl of a Spoon, to " receive it, and where it is collected into Heaps of the " Shape and Size of Lentils.

268. " The Bee arrived at the Hive with its Load of " Wax, finds ſome Difficulty of unburdening itſelf of ſo " tenacious a Matter; frequently being unable to lay it " down, it calls for Aſſiſtance by a particular Motion of " its Legs and Wings, upon which a Number of its " Companions ſtraight run to its Succour, and each " with his Jaws takes off a ſmall Quantity of Wax, o- " others ſucceeding till their loaden Fellow be disbur- " dened."

269. The Author of a ſmall Manuſcript gives the following Anſwer to both theſe Queſtions. " The Bee- " bread, ſays he, is the Farina, or Duſt of the Flowers, " which they gather in Mouthfuls. Then they take Wing, " and in Time of flying take it out of their Mouth " with their Fore-legs, and put it upon the Thighs of " their Hind-legs. Then they pitch again upon the ſame " or another Flower for another Mouthful, and repeat " the Operation ſo often, till they get a ſufficient Quan- " ty to carry home, which is always coloured accord- " ing to the Flower from whence they take it. This " Performance of theirs is eaſily perceived, when they " pitch upon a Flower that abounds with this Farina, " ſuch as the white Poppie."

270. "The Combs, by a great many People, are thought " to be made of this Bee-bread, which they carry in upon " their Thighs; but, tho' 'tis no Wonder that Beginners

" fall

" fall into the Miſtake, 'tis ſurpriſing that any who pre-
" tend to write on this Subject ſhould fall into the Blunder,
" particularly Mr. *Bradley*, who ſays, in the firſt Volume
" of his Book, That the Wax is the Duſt of the Stami-
" na of the Flowers; and in another Page alledges, they
" keep a Part of this Wax in their Cells for making more
" Combs, and for ſome other Purpoſes: His Error plainly
" appears from the following Obſervations.

271. *1ſt.* " The Bees of a new caſt Hive bring nothing
" home upon their Thighs for ſome Days; and yet, if
" you look into it, you'll find a good many Combs made.

272. *2d.* " Theſe Combs are all pure White, which
" they would not be, if made of Stuff of very different
" Colours.

273. *3d.* " If you take this Subſtance which they bring
" upon their Thighs, and try it with Fire, it will neither
" melt nor burn, as the Wax does, and in cold Water
" it diſſolves, which Wax does not.

274. *4th.* " To what Purpoſe would they bring ſo
" much Wax to an Hive, that is as full of Combs as it
" can hold, and yet every Body knows that they are as
" buſy bringing home Loads on their Thighs to old Hives,
" as young?"

275. A curious Bee-maſter, in the Way of Boxes with Glaſs-windows, ſays, " He has often obſerved theſe
" induſtrious Creatures take an admirable Method of
" unloading themſelves. By their two Foremoſt-legs
" they hing, ſays he, upon the Edge of an empty Cell
" above them, join their two Hindermoſt-legs together,
" thruſt them into an empty Cell below, and with the
" two Middle-legs ſcrap off their Burdens, which drop
" into the ſaid empty Cell; then away they fly, and
" other Bees come and diſpoſe of it in a more compact
" and orderly Manner. Thus they continue, ſays he,
" to repeat theſe Operations, until the Cell is full;
" but perhaps this they only do when the other Bees
" neglect, or rather have no Time to give them Aſſiſt-
" ance."

276. Now

276. Now I proceed to inform my Reader, whereof the Combs are made, which is out of a Subſtance they carry home in their Bellies; but whether this is a peculiar Juice they get in particular Flowers, or if it is a Compoſition of ſeveral Juices, ſo prepared in their Bodies, as diveſts it of Sweetneſs, and brings it to a due Conſiſtence, I ſhall not pretend to determine. Whatever it is, 'tis plain they bring it out of their Mouths, and apply it round the Edge of the Cell, much in the ſame Manner as the Swallow puts the ſoft Clay round the Brim of its Neſt, when it builds it.

277. This Performance may be ſeen by lifting up the Back-part of an Hive, when the Bees are throng at Work, where you may perceive a great many of them ſo employed at the ſame Time, in the moſt agile Manner you can conceive, whilſt others, in a more compoſed Way, are giving the Work the finiſhing Stroke, by bruſhing and garniſhing it over with their forked Tongues, and in this ſurpriſing Architecture of theirs, there are ſeveral Things very remarkable, ſuch as,

278. *1ſt.* The Hexagonal Figure of every Cell.

279. *2d.* How exactly they place the Bottom of every Cell upon the Partition in the Middle of the Comb, not oppoſite to the Bottom of thoſe Cells on the other Side of the Partition; but, on the contrary, the Bottom of the one that is oppoſite to the Side-walls of the other, which tends much to ſtrengthen the whole Fabrick; and all this exact Structure is framed, for the moſt Part, in the Midſt of a Throng, and in utter Darkneſs.

280. *3d.* Theſe Combs that are deſigned for receiving and keeping the Honey, which are principally thoſe next the Hive, have their Cells framed not directly Horizontal, but inclining a little upward for keeping the Honey from falling out, whilſt the Cells of the other Combs in the Middle of the Hive, deſigned for propagating the Young, ly directly Horizontal as fitteſt for that Purpoſe.

281. *Queſt.* 16th.

281. *Queſt.* 16th. How much Honey will a good Hive gather in a Week of good Weather?

282. *Anſw.* When the Bees are intent upon gathering Honey, and are not much employed in any other Affair, they will make a *Scots* Pint, or five Pounds *Dutch* Weight.

283. *Queſt.* 17th. Can Bees uſe any other Thing for Food but Honey?

284. *Anſw.* No doubt they can, ſuch as Syrups, Worts, and Decoctions of ſeveral other ſweet things, but I do not adviſe the Uſe of theſe but in abſolute Neceſſity, becauſe I know not but they may be hurtful to their Conſtitution, and ſo apt to bring Diſeaſes on them.

285. *Queſt.* 18th. What Number of Hives may be kept over Year in a Bee-Garden in the Country, and what, by a modeſt Computation, may be reckoned the Product of theſe Hives for a Year?

286. *Anſw.* If you ſet a aſide twelve to keep, which is certainly a very moderate Number, you may next ſeaſon look for twelve at leaſt to kill, and twelve more to keep again. Theſe you kill, you may well ſuppoſe to afford four *Scots* Pints of Honey each, in all Forty eight Pints, which, at 3 *s.* 4 *d. per* Pint, is eight Pounds *Sterling*. If you incline to keep Twenty four, which is ſtill a moderat Numbere, then you may Expect a proportional greater Profit, ſixteen Pounds.

287. It may likewiſe be ſuppoſed that a Hive that had four Pints of Honey in it, has alſo one Pound of Wax *Dutch* Weight, which, at one Shilling *per* Pound, is, for the Twenty four Hives, 1 *L.* 4 *s.* and which added to the ſixteen Pounds makes 17 *L.* 4 *s. Sterling*. No ſmall Sum to begot yearly after ſome Years, on no Expence but the Price of an Hive or two at the Beginning, (for it ſhall be herein after ſhown, where a fund will ariſe for the Price of Hives and other Incidents) and that by every Body who lives in the Country, with ſmall Trouble, and little Avocation from other Buſineſs.

288. Dr. Warder, propoſes the keeping of one hundered and ſixty Hives: But this might cauſe great

Confuſion

Confuſion, for let it only be ſuppoſed that a third, a fourth, a fifth, or even a ſixth of that Number ſhould Hive in one day, which may very probably happen, what a Diſorder would there be, how many Inconveniencies would follow! ſuch as two or three Swarms going together; others dividing, and not knowing for the Throng how to join again; others flying quite away, while you have not Time to ſtop their Flight. Theſe or ſeveral other ſuch like Accidents might fall out.

289. If any object that the Calcul of Profite is too low, and ſay, that one Hive with another, two might have been reckoned to produce three; I anſwer, I chuſed to be moderate, that my Reader may be agreeably diſappointed, and that a ſeparate Fund may ariſe, out of the additional Profits, for anſwering the Price of Hives and Incident-Charges.

290. Here I ſhall give Directions concerning the killing of the Bees, taking the Honey, and preparing and uſing the Wax, which makes a conſiderable Article in Commerce; the Conſumption thereof, thro' the ſeveral Parts of *Europe*, being very great.

291. As to the killing of the Bees, the beſt Way is with Brimſtone, whereof melt a proper Quantity in an Iron Laddle over a ſlow Fire, then take ſome pieces of Linen Raggs, and dipp them one after another in the melted Brimſtone, twiſting them about till they grow cold and firm, cut them in Pieces about three Inches long, then take three green Twigs and cut a ſlit in the End of each of them, into which thruſt the Brimſton-Match; then dig a Hole in the Earth near the Hive you are to kill, about a foot deep, and almoſt as wide as the Brim of your Hive, then thruſt your three Twigs, with the Brimſton-matches, into the ſide of this Hole at different Places, more then half Way to the bottom, and when you have kindled the Match, lift your Hive, and ſet it over the Hole, Puting the Earth round it to keep in the Smoke, for Ten or Twelve Minutes, in which time you are frequently to beat the Hive on all ſides with the Palm of your hand, to cauſe the Bees fall down.

292. All

292. All your Utenſils for the Honey having been before prepared, ſuch as large Pewter-diſhes, Sives, Knives, and Spoons, you are immediately to fall to Work, while the Honey is warm and thin, and having pulled out the Sticks, the great Ends whereof I directed to be left without the Hives, you are next to take out the Combs one after an other, which you are to give to different hands ſome whereof are to be employed in cutting off the waſte Parts of the Combs, and ſeparating thoſe Parts of them which are ſtuffed with Bee-bread, from thoſe which contain the pure Honey, while others are cutting down theſe pure Honey-combs in thin Slices into the Sives, firſt, obſerving to cut off all the ſealed Mouths of the Cells, ſo as the Honey may come the ſooner out and run thro' the Sives, which are to be ſet upon the Sticks you drew out of the Hive, laid over the Pewter-diſhes; which Sieves may be made larger and wider in the Holes, than thoſe commonly called Sowen [Flummery] Sives: For altho' Bits of the Wax or Combs go thro', they do no Harm to the Honey, but come up in a Scum upon the Top; but by all Means take Care to keep your Honey free from Bee-bread.

293. When the moſt of it is paſt thro' the Sives, and it begins to drop very ſlow, you may put what you have got in convenient Pots, and ſet the Diſhes and Sives before a moderate Fire, now and then ſtirring up the Combs with a Knife. The gentle Warmth will make it paſs the better; but you'll get more good Honey, if you put a Plate over a Veſſel full of very hot Water, and the Sive with the Combs upon the Plate; for the Heat will be communicate to the Combs, and make the Honey drop the more freely, without melting the Combs: The Plate ſhould cover the Veſſel containing the Water, and the Wax and Honey in the Sieve the Plate as near as can be; and when no more will come, put the Combs in a Pan over a ſlow Fire, and wring out the reſt with your Hands, which keep for feeding your Bees.

294. A Lady of my Acquaintance informs me, that ſhe uſes to purify Honey, by ſetting a Can with it on a

Matt of Hay or Straw, for Fear of breaking the Can, in a Kettle, Pot, or Pan full of Water, putting the Kettle with the Can on the Fire, and boiling the Water, which after a competent Time, melts the Honey; and as it melts, and thereafter cools in the Can among the Water, throws up Wax and Refuſe; which being ſcummed off, the Honey thus purified, becomes more medicinal, looks better, taſtes ſweeter, is leſs apt to cauſe Colicks, and proves qualified for keeping many Years; whereas this being neglected, it often ferments in Summer, and is damnified.

295. For preparing the Wax, take thoſe Balls or Globules which are wrung out from the Dreg of the Honey, and put them in a clean Kettle, or Pan over a moderate Fire, with a ſufficient Quantity of Water, always ſteering it about till it boils, and when you find it all melted, take it out by Laddle-fuls, putting one or two at a Time in a large Bag, ſewed in the Shape of a Funnel, commonly called *Hypocrates's Sleeve*, made of thin ſtrong Canvaſs, and ſo long as the Upper-part may come over the End of a Deal-board, which is to reſt upon your Breaſt, with the other End in a Veſſel fit to receive the Wax, which you muſt preſs out with a Piece of Wood, made for the Purpoſe, much after the Way that Tanners dreſs their Leather.

296. When you have got it all paſt in the aforeſaid Way, which I have found to be the beſt, gather it again, and put it in a clean Kettle, with a convenient Quantity of fair Water, and melt it ſlowly over the Fire, you may, or may not, put it again thro' the Funnel; but, ere cold, ſcum it with a Tyle, or Piece of wet Wood, and caſt it while yet warm in Wooden, Earthen, or Metaline Moulds, or in any Veſſel which gradually widens to the Brim, having firſt anointed it with Honey, Oyl, or Water, to prevent the Wax from ſticking; let it ſtand all Night, then take it out, and cut off the Refuſe with your Knife till you come at the pure Wax. Some to purify it, make uſe of *Roman* Vitriol or Copperas; but the true Secret is to melt, ſcum, *&c.* properly, without any Ingredients.

297. The

297. The beſt is that of a high Colour and an agreeable Smell, and that does not ſtick to the Teeth, when chewed; 'tis often ſophiſticated with Roſin or Pitch, coloured with Rocou or Turmerick; the Fæces remaining in the Bag after expreſſing the Wax, are uſed both by Surgeons and Ferriers with Succeſs againſt Strains.

298. The whitening or blanching of Wax is performed by reducing the yellow Sort, firſt into little Bits, or Grains by melting it, and throwing it while hot into cold Water, or elſe by ſpreading it into very thin Leaves or Skins, or cutting it into ſuch by a Knife or a Wheel.

299. This Wax thus granulated or flatted, is expoſed to the Air on Linen-cloths, where it reſts Night and Day, having equal Need of Sun and Dew; then they melt and granulate it over again ſeveral Times, ſtill laying it out to the Air in the Intervals between the Meltings.

300. When the Sun and Dew have at length perfectly blanched it, they melt it for the laſt Time in a large Kettle, out of which they caſt it with a Laddle upon a Table, dented over into little round Cavities of the Form of the Cakes of white Wax ſold by the Apothecaries, *&c.* having firſt wet theſe Moulds with cold Water, that the Wax may be the eaſier got out.

301. *Laſtly*, They lay out theſe Cakes to the Air for two Days and two Nights, to render them more tranſparent and dry. This Wax is uſed for the making of Torches, Tapers, Flambeaux, Figures and other Wax-works. It is alſo an Ingredient in Plaiſters, Cerats, and divers Pomatums, and Unguents for the Complection.

302. Now, I flatter myſelf, that the greateſt Part of my Readers will acknowledge, that, tho' I ſhould ſay no more, I have treated this Subject, in a Way more practical and uſeful than any other hath done; yet I foreſee that ſome will cry out, notwithſtanding of what I have ſaid concerning Mr. *Geddie*'s Invention; mercileſs, barbarous Man! Why are you for killing the Bees, thoſe wonderful and profitable Inſects, ſince many Ways,

Ways more advantageous, may be taken to ſhare the Profits of their Labours with them?

303. If any Method is even near as profitable as the killing Way, I wiſh it was univerſally practiſed; ſo, that you may know which is the beſt by different Experiments, which if made at one Time, in the ſame Garden, and with equal Prudence and Care, will the moſt ſurely determine which of the Ways ought to be taken. I ſhall firſt offer you Directions for keeping the Bees in Colonies or Boxes, with Glaſs Windows, without killing them, agreeable to Mr. *Geddie*'s Invention, for which he got a Patent from King *Charles*, you ſhall next have Mr. *Thorley*'s, as in his female Monarchy, and then the Author's of the Natural Hiſtory. The two laſt, ſo far as I know, are the lateſt Writers on the Subject of Bees.

304. If you are to try Mr. *Geddie*'s Way, an open Bee-Houſe, ſuch as Straw-Hives are commonly kept in, will not do. You muſt have one, to keep your Colonies in, cloſe with Doors both before and behind; for if your Boxes were expoſed to the Beams of the Sun, it would ruin your Colony, in hot Weather, by melting the Honey and Wax.

305. This Method is taken to prevent ſwarming, for Bees ſwarm generally for Want of Room, which they get by giving them another Box when the former is full: But it is here to be noted, that this does not always prevent ſwarming, tho' generally it does.

306. A Bee-Houſe fit for containing ſix Colonies or Boxes (which if full of good Bees, will at ſometimes employ eighteen Boxes) ſhould be twelve Feet long and two broad. In this Houſe all your ſix Colonies ſhould be ſet at an equal Diſtance one from another, but the two outermoſt no nearer to the Ends than four or five Inches: The Reaſon is, that you may conveniently put down your Hands, to take hold of the Handles of the Boxes for lifting of them.

307. Make a Frame for the Houſe in this Manner. Each of the two Ends muſt have two Pillars. The two to the one Side ſhould be each four Feet high, but the two

on

on the other muſt be a ſmall Degree higher, if you make the Houſe To fall Way. Theſe muſt be faſtened together with a Piece of Board, about a Foot from the Ground for the Floor to reſt upon them, then, with thin Bits acroſs, fix them together in ſeveral Places; Next, faſten the two Plates of the Houſe, the one before and the other behind: They muſt be of whole Deal, twelve Feet long and four Inches broad, with a Rabbet in the lower Side for the Doors to ſhut into; Nail Rafters to the Plates, and Proportion them in Number and Strength to the Weight of the Roof you intend to put on. The lighter the better if it hold out the Rain. Make four Doors for the Front, and four for the Back of the Houſe: Fix upright Pieces, where they will not incommode you in the Management of your Boxes, to faſten the Doors to. You may put Locks on them if you pleaſe, but they ſhould have Rabbets, made by cutting Channels in them, that they may go ſo over one another, that one Door may keep another faſt. In ſhort, this Bee-houſe muſt have Doors all along both before and behind, that you may open any Part of it as you have Occaſion, and theſe Doors muſt go as high as the Eaves of the Houſe will let them.

308. You muſt alſo have a Ledge, which muſt be made with great Care of a Board twelve Feet long, one Inch and Quarter thick and two Inches broad; it muſt have a Rabbet of Half an Inch for the front Doors to ſhut into, and to anſwer to the Rabbet in the Plate of the Houſe; but there is no Occaſion for a Ledge on the Backſide. The Floor muſt come to the very Outſide of the Houſe. And the Ledge muſt be nailed on all along to the very Outſide of the Floor; ſo when the Door is ſhut into the half Inch Rabbet, it will be even. Before you nail down the Ledge, you muſt cut out, in the under Side of it, ſix ſmooth Paſſages for the Bees to go out and in at, make them four Inches long and half an Inch high. Under each of theſe Holes you muſt fix a Landing Board wider than the Hole, at leaſt two Inches broad, and ſet it a little ſlopping, that the Bees may pitch upon it the more conveniently: The Floor muſt be ſupported in

two

two or three Places, or it will ſwag with the Weight, it will have to bear, and put all out of Order.

309. The Doors muſt be made of well ſeaſoned Wood, and ſo cloſe that it will not ſhrink in the Heat of Summer, and let the Bees, much leſs the Mice, go in and out at the Chinks, or any other Way, but through the Holes cut out for the Purpoſe in the Ledge under the front Doors.

310. The main Deſign of the Ledge is not, that the front Doors may ſhut into the Rabbet of it, but to make Lines of Communication from the landing Boards to the Boxes. And tho' an Inch would be ſufficient to contain Holes for the Bees to go through, and the Rabbet for the Doors to ſhut into, yet to prevent two great Inconveniencies, it muſt be two Inches broad.

311. 1*ſt*. The Glaſs-Window in the Foreſide of every Box, would then ſtand only half an Inch from the front Door of the Bee-houſe, which in very warm Weather would make the Bees ſo hot, that they would not be able to endure the Heat, or if they did, the Honey would run. In either Caſe the Colony would be ruined. But,

312. 2*dly*. A Straw-hive would come too near the Door, if the Ledge was but an Inch broad, for when you put it into your Bee-houſe, which you muſt do at firſt, as ſhall be ſhewn, there is a Neceſſity that the Entry to it touch the Hole in the Ledge, ſo the Belly of the Hive would ſo hang over it, that the Door of the Bee-houſe would not ſhut without thruſting back the Hive, which would occaſion ſeveral Inconveniencies, which are prevented by making the Ledge two Inches broad.

313. Beſides the Standards your Doors are to lock into, it is proper to have Haſps of Wood, ſix before and ſix behind, which will turn upon Nails, and by which you may keep the Doors ſo faſt in their Places, that the wet Weather will not by ſwelling, or the hot by warping, put them out of Order. Which Inconveniencies are alſo in a great Meaſure prevented by painting the Houſe well: This is likeways uſeful for the Preſervation of the Wood.

314. Take care when making your Bee-houſe, to contrive the Doors ſo, that none of the Standards where into they are to lock, may be oppoſite to any Part of the Boxes, but exactly to the Spaces betwixt Box and Box.

315. The beſt Way to know exactly where to cut the Holes in the Ledge is, to take two Boxes, and placing one of them within four or five Inches of each End, make a Mark for a Hole in the Ledge exactly oppoſite to the Entry to each of theſe Boxes; mark alſo before altering theſe two Boxes, the Length of the intermediate Space betwixt them, which being divided into four equal Parts for the four Boxes remaining of the ſix, you ſhould make Holes in the Ledge for theſe four Boxes, oppoſite to the Middle of each of theſe four Diviſions. And then the Entries into the Boxes being placed to the Holes in the Ledge, the whole Boxes will ſtand at equal Diſtance from one another, the Breadth of all the Boxes being equal.

316. A Houſe for ſix Colonies will coſt very little more than one for two or three, but if leſs than ſix, I think three is the beſt Number, and any good Workman can eaſily vary the Rules for a greater Number to anſwer for a leſſer, *& è contra.*

317. The Doors and every Part of the Houſe ſhould be made ſo cloſe, that the Bees get not in or out, except at the Holes made in the Ledge on Purpoſe, becauſe Cloſeneſs not only defends them againſt the cold, but preſerves them from Thieves and Mice: Care ſhould alſo be taken that there be no Chinks, or any other Defects in the Boxes, that may let any of the Bees into the Houſe, for they would be loſt.

318. The Boards of the Floor ſhould be very ſmooth and even, that the Bees may not get out betwixt it and the Boxes, and periſh. The Cover of the Houſe ſhould be twelve Feet four Inches long, that it may come two Inches over each End, and the Houſe ſhould be ſtrongly faſtened, by large Poſts of Oak driven into the Ground at each Corner, to prevent its being blown down by high Winds.

319. For

319. For making your Boxes, with Iron-handles and Glaſs Windows, you muſt have ſlit Deals of the beſt kind, nine or ten Inches broad, and an Inch and half thick, before they are ſlit, ſo that the ſlit Deal will hold about half an Inch when plained upon both ſides.

320. One of your Deal-boards muſt be ſlit into three: Theſe being thinner than the reſt, are to make Sliders for the Tops of the Boxes and Doors over the Glaſs-windows: You muſt alſo have ſquare Panes of Glaſs, five Inches broad, and ſeven Inches long, Trunk-handles of Iron, long Bits of thin Iron, or Tin five Inches long and an Inch broad, ſome ſmall Hinges, Nails, and Sprigs.

321. Then let the Workman form a Mould, that he may make the Boxes the better, and exactly of a Bigneſs, to fit one another when they come to be uſed: The Bench ought to be very ſmooth, exactly even, and well plained; for if it is uneven, ſo will the Bottom of the Boxes, and conſequently be unfit for the Floor of the Bee-houſe; and whereas the Form of the Box ſhould be Eight ſquare, ſo muſt the Mould.

322. Upon the Bench, the Carpenter ſhould mark out, with his Rule and Compaſſes, an Eight ſquare of eighteen Inches Diameter, which is the Breadth of the Box: Then he ſhould fit ſmall Bits of Deal for a Mould within the Place marked out: Theſe Bits which need not be above half an Inch broad, being nailed down to the Bench in an Octagonal Form of ſeventeen Inches Diameter, the Box which is made on the Out-ſide of this Mould, will be eighteen Inches, or a little more, according as the Board the Box is made of is in Thickneſs.

323. Here take Notice, that this Mould is not to be taken from the Bench, till as many Boxes are made as are deſigned; for you'll find by Experience, that when they are all of one Bigneſs, and fit one another exactly, they will be uſed with much leſs Trouble, than when they are otherwiſe made, either thro' Ignorance or Careleſſneſs.

324. The Mould being made, take one of the thickeſt Deals; cut it into Lengths of eighteen Inches, and glue two and two together, to make the Tops of the Boxes, which muſt be eighteen Inches over; ſo having glued as many of theſe two Breadths together, as you deſign to make Boxes, then proceed to plane your Boards well on both Sides; and thereafter to ſaw out the Scantlings of the Boxes, which muſt be ſeven Inches and a Quarter in the wideſt Part, and ſix Inches and three Quarters in that Part that is to be the Inſide of the Box, the Edges being thus ſmoothed off with a Plane.

325. Set theſe Scantlings thus prepared upright, and ſtay them down to the Bench and Mould with Sprigs, and ſo you will find that Eight of theſe Pieces of Wood, will come round the Mould, tho' every Box muſt have but Six of them, becauſe the Squares before and behind muſt not be of theſe Boards, but framed with two Rabbets: One Inſide Rabbet, to receive the Glaſs in the Inſide of the Box, ſeven Inches long, and five Inches deep; and another Rabbet on the Outſide above the Glaſs, to receive a thin Door, which muſt be made to ſhut over the Glaſs-window, and hung to the Frame by ſmall Hinges, and muſt alſo be planed very thin; for the whole Frame containing the Glaſs, and this little Door, muſt be no thicker than one of the other Boards, and uſed as one of them in both the fore and back Part of the Box.

326. That you may conveniently open the Door when you incline to ſee what your Bees are adoing, and ſhut it again when you have done, a ſmall Button of Wood to turn upon a Nail, ſhould be therewith faſtened to the Side of it.

327. Now, when you have fixed theſe two Frames with Glaſs-windows, one before and another behind, fitted the ſix Pieces to them, and with Sprigs faſtened them together, then fit the Head, which muſt not be nailed on the Top of theſe Pieces, but cut exactly, and

with great Care let down within them, and then all the Pieces being well ſprigged to this Head, the Box is made, but not quite finiſhed.

328. Four Things remain ſtill to be done before 'tis compleated. A Hole is to be made in the Top of the Box with a Slider over it, and a little Slider under the Front-door; the Handles are to be put on, and two Sticks placed within the Box acroſs for ſupporting the Combs.

329. As to the Hole in the Middle of the Top, it ſhould be five Inches ſquare, and half an Inch on each Side of the Hole muſt be cut in Grooves for a Slider to run in, that when 'tis once faſtened in, it ſhall not riſe to come out, but only ſlide to and fro in order to ſtop, or leave open the Hole of five Inches ſquare, as Occaſion requires; for when the Box is to be the uppermoſt one, then the Slider muſt be thruſt home to ſhut the Hole; but then the middle or under Box muſt have this Hole open, the Shutter being drawn back, this Hole ſerving for a Communication betwixt Box and Box. To this End pare away with a Chizel a Place for the Slider, which muſt be at leaſt half an Inch wider than the Hole, and run in a Groove, made hollow on Purpoſe for ſhutting the Hole, or drawing back.

330. This Cutting on the Top of the Box muſt be as deep as your Slider is thick; but the beſt Way is not to have the Hinder-part of this Shutter of the whole Breadth of the other End, but cut to two Inches, which is ſufficient for driving it home, when you want to cut off the upper Box of Honey, and more convenient, than if it was left to the whole Breadth, and it muſt be ſo ordered in the making this Slider, that when it is brought quite back, this narrow End may be even with the Outſide of the Box, and two little Bits muſt be nailed after the Shutter is made and put into its Grooves, on each Side of the narrow End of it, to fill up what is cut away therefrom, which will hinder it from falling out, and prevent the Bees from coming out at either Side.

The Slider ſhould be ſhaved away to a narrow Edge in the broad cutting End, and then have a thin Bit of Tin or Iron nailed on it; when, tho' it be not very ſharp, it will cut the Honey and Wax that is in the Hole.

331. The next Thing is a Slider in the Edge of the Box under the Front-window. That Square of the Box, where the narrow End of the broad Slider before ſpoken of is, muſt always be the Hinder-part, and this narrow End muſt always come over the Back-window; ſo under the contrary Window, which is the Front-window, there muſt be a Paſſage cut about half an Inch in Height, and four or five Inches in Length, and you muſt make a little Slider to ſtop this Hole alſo, when there is Occaſion, or as much of it as you think fit.

332. This little Slider muſt be cut with ſlopping Edges, and the Box where it is to go muſt be hollowed; ſo that when 'tis thruſt home, as 'tis always when a Box is raiſed, it may ſtop the Hole cloſe, and alſo be entirely of the Box, and not fall out. This Slider muſt be about ſeven Inches long, ſo as to come about two Inches without the Box, with a Notch cut near the utter End, to pull it out by when 'tis too far in, or to draw it out to its full Length, if there be Occaſion, without diſturbing the Bees.

333. Now, put the Iron-handles on the two Sides of the Box, that you may lift it conveniently, either when you ſtand before or behind it: Take Care that they be clinched faſt in the Inſide. 'Tis beſt to put them in the Middle, neither near the Top nor Bottom.

334. In the Months of *June*, *July*, and *Auguſt*, when the Colonies, by Reaſon of their continual Breeding, come to be very full, if the Weather is very hot and ſhowery, the Bees, by natural Inſtinct, ſenſible of their Danger, by being abroad in the Time of Rain, preſs home in ſuch a violent Haſte upon the leaſt Appearance of it, that they ſometimes ſtop the Paſſage ſo cloſe, that thoſe within are like to be ſuffocated for want of Air, which makes them ſo uneaſy, that they are like mad Creatures within the Box.

335. To

335. To remedy this, cut a Hole two Inches ſquare in the Back-part of it, about the Middle, and over this Hole in the Inſide, nail a Piece of Tin-plate, punched full of Holes as large as you pleaſe, provided the Bees cannot creep out at them; then make a very thin Slider to run in Grooves over this Hole on the Outſide, that when it is thruſt home, all may be cloſe and warm; and when there is Occaſion in violent hot Weather, it may be drawn back, that the Air may freely paſs thro' thoſe Holes, and the Diſorder aforeſaid, as well as their Swarming be prevented, or, which will do as well.

336. Bore Holes with a Piercer as thick as you can, in the ſame Place for two Inches ſquare, and put a Slider on the Outſide over theſe Holes. The drawing back of this Slider to let in Air, is a probable Way to prevent Swarming, till by the increaſing of their Numbers you are forced to raiſe the Colony upon another Box; the Manner how, and the Time when to do it, you ſhall find at large deſcribed in its proper Place.

337. The laſt Thing is to put two half Inch ſquare Sticks, made out of your Deal, acroſs in the Inſide of the Box, and the one two Inches above the other; the loweſt ought to be about two Inches from the Bottom, and both faſtened at the Ends, by driving a Nail thro' from the Outſide of the Box into each of the Ends, but not quite to the Head, that when you are going to take out your Honey, you may draw the Nails, and then the Sticks with the Honey will come eaſily out.

388. It may be obſerved on the foreſaid Deſcription of the Box. *1ſt.* That no one Thing directed can well be omitted. The Slider under the front Window is but a ſmall Part; and perhaps you may think it can very well be wanted, but it ſerves when robbing Time comes, to ſtraiten the Paſſage more or leſs as you pleaſe; yea, ſometimes you will be forced to thruſt it ſo far in, as only to leave Room for one Bee to go in or out at a Time, and when you raiſe one Box upon another, you muſt thruſt it quite home. Then being held in a Groove, it cannot

not fall out, but makes that Part of the Box close and intire, and so one Box being raised upon another, the Bees must work in and out thro' the Hole of the lowest.

339. 2*dly*. If the Handles were not strong and well fastened, and should fail lifting up a Box or sometimes two, which may be the Weight of one hundred Pounds, lying upon the Handles, the Fall might prove the Destruction of the Colony.

340. 3*dly*. As to the Sticks, they are needful for supporting the Combs with the Honey, as I have said, and 'tis better that they go thro' the Box in the Form of the Letter *X* than exactly across. The Doors for the Glass-windows are necessary for keeping out the Light from the Bees, for if they had it always upon them, it would much disturb them.

341. 4*thly*. There are two other Instruments, which a Bee-master in the Colony Way cannot want; they are a light wooden Mallet and a thin Piece of Wood, rather thinner than the broad Slider on the Top of the Box, about nine Inches long, and of the same Breadth of the narrow End of the great Slider.

442. These two Instruments are for taking one Box from off another, by setting the End of this thin Bit of Board against the narrow End of the Slider of the lower Box, and with the Mallet driving it, until the Combs in the Hole in the Top of the Box be cut through, that the upper Box may be taken away as shall be directed.

343. For furnishing your House with Bees, buy Hives, and bring them home about *October*, by the Rules hereinbefore offered; after they have been one Night with you, about Six o'Clock next Morning, set all your Hives with their Mouths against the Holes made on Purpose in the Ledge under the Bee-house Door, and then with Lime and Hair smooth up all within the House, so that no Bees may get out of the Hives any where but thro' the Holes in the Ledge, and then generally you have little more to do till *April* or *May* next.

244. *October* is reckoned a better Time for purchasing than *May*, yet if you have the Opportunity of good

Swarms

Swarms near you, you ſhould not neglect it, but then you muſt bring them home the ſame Day they ſwarm, and put the Hives with their Mouths againſt the Holes in the Ledge as aforeſaid.

345. Tho' you furniſh your Houſe with Swarms in *May*, yet that will not more forward the working down of the Bees into the Boxes, than if you bought Hives in *October*, for thoſe will be fit to be raiſed upon the Boxes in the Spring following, and the Swarms will be no more. But,

346. If you incline to buy Swarms, you muſt, as I have ſaid, bring them home the very Day they are ſwarmed; for if you ſhould let them ſtand two or three Days, and the Weather prove good, they may make Combs to hold Honey to drown themſelves, becauſe the Virgin Honey is fine and thin, and the Combs being then tender and the Weather warm, they are apt to break down in the Carriage.

347. The Cloths the Hives are tied in when brought home, ſhould be large and thin, becauſe if they were thick, ſuch as Diaper or Damask when new, they would be too cloſe for the Bees to breath thro', and being ſo, tho' they might not be ſuffocated, would make them very angry and troubleſome in the putting into the Houſe; and large they muſt be, otherways they would not tie over the Hives.

348. If the Spring be early, the breeding of the Bees will be forward: You muſt therefore obſerve them in the End of *April* and in *May*, but muſt not raiſe them upon your Box, till they begin to ly out with a Tendency to ſwarming, then and no ſooner are they to be raiſed, and you are to proceed thus.

349. Having your Box ready with the Top-Slider quite open, that the Bees may paſs from the Hive down into the Box, aud the Slider in the Mouth of it drawn back, that they may have Room enough to work in and out, then open both the fore and back Door of that Part of the Houſe where the Bees are to be raiſed; when cauſe ſome Body ſtand ready with the Box, holding it by the

two

two Iron Handles at the Front of the Houſe, and the fore Slider or Mouth of the Box to him ward.

350. This done, go you behind the Houſe, and gently lift up the Hive ſo high, that the Box may go under it, then cauſe him with the Box in his Hand, ſet it with its Mouth cloſe to the Hole of the Ledge ſo often ſpoken of, which being carefully done, ſet down the Hive as exactly upon the Middle of the Box as you can gueſs, then ſtop the Mouth of the Hive with Lime and Hair preſently, ſo the Bees will immediately work down thro' the Hole in the Top of the Box, and in and out at the Hole in the Ledge they were uſed to before, without any Hinderance.

351. If you ſhould raiſe the Hive on the Box before they want it, you would greatly hinder their Work, by their being obliged to carry it thro' an empty Box to the Hive, which they had not filled, and if you ſhould not preſently ſtop the Mouth of the Hive, the Bees would ſtill hang about it, and not go down into the Box, but the Mouth of the Hive being cloſed up, they go immediately downward, having no other Paſſage except into the Box, and the Mouth of it ſerves for the ſame Purpoſe that the Mouth of the Hive did.

352. By the Uſe of the Glaſs-windows, you will know better, when to raiſe the firſt Box and Hive upon the ſecond Box, then you could underſtand when to raiſe the Hive.

353. When the Bees have ſo wrought in the Box, that the Combs come to the Window of it, and it ſeems very full of Bees as well as Combs, then is the Time to raiſe it on another, eſpecially if you ſee them ſeal up their Honey in the Combs half Way down the firſt Box, which you will alſo eaſily do by looking in at the Windows.

354. Then place ſome Body before that Part of the Bee-houſe, with a Box ready in his Hand, the broad Top-Slider being drawn quite back that the Hole may be fully open, and the Slider in the Mouth or under Part of the Front of the Box being drawn ſo far back, as to leave

leave a ſufficient Paſſage into it, which being done, take hold of the Handles of the firſt Box, lift up it and the Hive above it together, and ſet the ſecond Box under them, which in a good Summer, you will ſometimes have Occaſion to do by the Middle of *June*.

355. Thruſt home the Shutter of the firſt Box immediately, that no Bees may come out there, but work in and out thro' the ſecond, and be very obſervant that the Mouth of the Box be not only exactly oppoſite to the Hole in the Ledge, but that the Box be ſet ſo cloſe to it, that the Bees cannot creep between the one and the other.

356. If the Boxes when ſet upon one another as directed, do not go ſo cloſe together, but that there be Room for the Bees to come out betwixt the Joinings into the Houſe, then you muſt take a Knife and fill up the Chinks with Lime and Hair, and if they can get out betwixt the Box and the Floor, you muſt do the ſame So now having a compleat Colony of two Boxes and an Hive, you have nothing to do till you take off the Hive.

357. When by the Glaſs-windows you perceive that the middle Box is well filled, then to take off the Hive proceed thus. Fix a Napkin by one End, with ſmall Nails or Pins on the Landing-board, where the Bees pitch before they go in. It ſhould be cloſe up to the Hole, but not to ſtop it, leaſt the Bees be diſturbed and their Work hindered.

358. In this Operation you have Occaſion to open only one of the Backdoors of the Bee-houſe, and then if the Top-Slider of the uppermoſt Box will not by thruſting it with your Hand, make its Way, cut the Combs, and cover the Hole, (which being the quieteſt Way will give leaſt Diſturbance to the Bees) you muſt take the thin Piece of Board and Mallet before ſpoken of, go behind the Colony, and ſetting the Board againſt the narrow End of the Top-Slider of the upper Box, with the Mallet drive it home till it cut the Combs that are in the Hole, which muſt be thus performed.

359. Hold the thin Board in your Left-hand, and with the Mallet in the Right, give it two or three Stroke

till it is home, all the while preſſing the Board, with your Left-hand, hard againſt the End of the Slider, and carrying your Hand even, that when you drive it with the Mallet, it may not ſlip over or under, but keep directly againſt it till it is quite thro'.

360. Then take hold of the Hive, which, being cut from the Box, will with little Force come up from it; and as you take it up, twiſt it a little round, ſo it will the eaſier part from the Box: Next, carry it away twenty or thirty Yards from the Bees, if your Garden will admit of it, that you may be eaſy and quiet while performing the reſt, for the Smell of the freſh Honey in the Hive you have taken off, might draw the other Hives about you.

361. Now, place your Hive with the ſmall End downward in a Pail, Peck, or Flower-Pot; ſo the ſmall End going into any of theſe Veſſels, it will ſtand firm; thereafter take an empty Hive, and place it on the Top of your Hive with Honey, Mouth to Mouth, then take a large Cloth, and tie them round at the Joining, that no Bees may get out.

362. This being done, ſtrike pretty hard with a Stick, to ſhake the Bees that are within; beat ſometimes on one Side, then on the other, and ſo all round, letting them ſtand a little, now and then, without ſtriking, that the Bees crawling up may have Time to go into the empty Hive; then beat again, all the while holding your Hand on the empty Hive, to keep it in its Place, otherways it might fall off by the ſhaking of the other.

363. When you have done ſo more than a Quarter of an Hour, being always cautious leſt you beat the upper Hive, which would make thoſe fall that were aſcended, let them ſtand ſtill a little, and then taking the top Hive in your Hand, which now hath all the Bees that were in the other Hive, carry them away to the Napkin, and laying a Stick on that Part of it, which lieth on the Ground, with one ſmart Stroke of the Hive on the Stick you will ſhake out all the Bees, where they will ly a little, and then crawling up the Napkin go home

to their Fellows, who will gladly receive them, as their Acclamations, which thoſe who are uſed to them, very well know, ſufficiently teſtify; ſo you have the Honey and they undiſturbed keep to their Labours, ignorant of the Trick you have plaid them.

364. On this Occaſion you will ſometimes ſee the King on the Napkin, and you'll be highly diverted, obſerving him with great Majeſty, marching up upon it with his Subjects, and into the Hole of the Ledge which leads into the undermoſt Box. But you ſhould never venture to take off an Hive or upper Box, unleſs you have good Reaſon to be perſuaded that there is a Sufficiency of Honey in the middle One, to maintain ſo great a Stock of Bees thro' the Winter, leſt you loſe the whole Colony, by the Want of what you have taken away.

365. Theſe Directions concerning the taking off the Straw-hive, will in a great Meaſure teach you, how and when to take off the upper Box the next Year after it is gone. So I ſhall not ſay much upon this Head, only you ſhould ſet the upper Box on the Ledges of a Joint-ſtool, turned upſide down, and inſtead of a Straw-hive to ſet upon the Straw-hive, you muſt now place an empty Box on the full one, and knock as before directed, on the Edge round the Top, which will be undermoſt next the Joint-ſtool, ſo the Bees will aſcend into the empty Box, and muſt be knocked out on the Napkin as before.

366. When you ſtrike the Box on the Stick that lies on the Napkin, in order to return the Bees to their Fellows, you muſt take Care that you don't turn thoſe Squares where the Glaſs-windows are over the Stick, leſt the Stroke might endanger the breaking of the Glaſſes.

367. If you keep no Bees in Straw-hives to get Swarms from, and have a mind to have one early in the Spring, then be ſure to take off the under Box in *September*, when it ſeldom hath Honey, and ſet the upper one down to the Floor. This is done by driving home the Cutter of the under Box, ſtanding behind the Bee-houſe, and lifting up the ſecond Box by the Handles

two or three Inches, and then causing a Servant, standing before the House, take the under one quite away. Then set down that in your own Hand, and draw back the Door-slider under the front Window, that the Bees may have Room to go in and out thro' that Passage.

368. And whereas some of them will be about the Combs in the Box taken away, knock them out or disturb them, and they'll fly home. So your Colony being thus reduced to one Box, you'll not miss to get a large and early Swarm, when the Spring comes, if you don't raise them upon another Box. Which Swarm you may keep as well in a Box as a Straw-Hive, and set it down in your Bee-house with the Mouth-shutter drawn back, and the Top-slider shut up, the Mouth of the Box being close to the Hole of the Ledge as before, so you may have a Swarm out of a Box as soon or sooner, than you could out of a Straw-hive: For a Way to cause them swarm is to straiten them of Room, and to hinder them is to give them more of it, as has been said, both which may be easily done in Boxes.

369. In these Descriptions and Directions concerning the Husbandry of Bees in the Colony-way, and without killing them, I have had my Eye chiefly on what Dr. WARDER has said thereupon, which I was the more disposed to do; because a learned curious and ingenuous Gentleman, who assisted me when I revised this Performance, says, "That in this Way of Colonies, and "by following the *Doctor*'s Directions, he has practised the "Bee-husbandry, both in Timber Boxes and Straw-hives, "betwixt thirty and forty Years, so successively, that "he is resolved he will never alter his Method." But I think 'tis just to mention, that I found he had so great an Aversion to the killing of Bees, that I believe he would not do it, tho' he was sure to make more Profit.

370. He says further, "That he has often had in "his Way upwards of fifty *Scots* Pints of Honey in a "Year, besides the candyed which he made into Mead; "and that he has several Times of late Years had Vir-"gin-honey, by placing an empty Box or Hive on the

"Top

" Top of a lower one, into which the Bees went up " and filled it with Combs and Honey; " which is contrary to Mr. WARDER's Opinion; for he ſays expreſly, *That theſe Induſtrious Servants of ours, tho' they may be helped in their working, by ſupplying them with Room; yet they muſt not be contradicted in the Nature of their working, which is always to work downward, and not upward.* The Gentleman who, as I told you, has had thirty or forty Years Experience of this Way of doing, ſays, " That the ſame lower Box or Hive ſhould " not be kept above two or three Years together, leſt " the Combs, growing old, become too thick by the " young Brood's leaving a Skin therein, which you may " remember was obſerved in another Caſe. "

371. I have ſeen his Straw-hives in the Colony-way. They are round, as wide at the Top as at the Bottom, have four Pieces of Timber planed, not quite ſo thick as a ſquare Inch, of Length exactly equal to the Height of the Hive, are fixed thereto at equal Diſtances from one another, and they have Croſs-ſticks betwixt each two of them, as in the Timber-boxes deſcribed.

372. Theſe four Pieces of Timber are neceſſary, becauſe the Straw-hive would not without them be able to ſupport the Weight it gets to bear; and becauſe, by the Means of Handles fixed into them thro' the Hive, it can be lifted, as Occaſion requires.

373. Each Hive has likewiſe, in the Back ſide of it, a Glaſs-window with a Timber-ſhutter neatly ſewed in with a Pack-threed; the Head is of Timber with a ſquare Hole in it, as in the Timber-boxes deſcribed: He ſays, " Theſe Straw-hives may be uſed in the Co- " lony-way without a Houſe, tho' the Timber Boxes " cannot for the Reaſons formerly given. "

374. I ſhall next offer you in Mr. *Thorley*'s own Words, what he calls *His new eaſy and effectual Method, to preſerve Bees not only in Colonies, but common Hives, from that cruel Death to which their ignorant, injurious and moſt ungrateful Owners*, ſays he, *ſo commonly condemn them; a Secret unknown to paſt Ages, and now publiſhed for the*

the Benefit of Mankind. You ſee he is vain of his Secret.

375. "The Preſervation and Improvement of Bees "in Colonies, has been no Secret ſince Mr. *Geddie*'s hap- "py Invention, and how effectually to promote the ſaid "Ends in the Way of common Hives, is the kind De- "ſign of this Chapter.

376. "From the long Converſation I have had with "theſe very wonderful Creatures, their inimitable Ex- "cellencies, and many commendable Qualities, toge- "ther with their great Uſefulneſs to Mankind, I am "become one of their greateſt Admirers, and a Publick, "may I prove a prevailing and ſucceſsful Advocate for "them, moſt ſolemnly proteſting againſt all that notori- "ous Unjuſtice, and inexcuſable Ingratitude of their "cruel, and mercileſs Owners, who not content with all "their Treaſure, collected with infinite Pains and many "Perils, devote them to Deſtruction without any Di- "ſtinction, or the leaſt Pity and Compaſſion.

377. "Not unlike ſo many bloody Ruffians and Mur- "derers, who not ſatisfied to rob others of their Sub- "ſtance, do ſacrifice their Lives, their deareſt Poſſeſ- "ſion, for which they are the juſt Abhorrence of Man- "kind: A righteous Man regards the Life of his Beaſt, "and is no Regard due to theſe Creatures of GOD, "which are ſo excellent in themſelves and ſerviceable "to Men? Was *Balaam* rebuked only for beating his "Aſs? What Cenſure do theſe deſerve who thus de- "ſtroy ſuch Multitudes of innocent uſeful Creatures, "and moſt faithful Servants? Are they Righteous who "are thus cruel and barbarous? Or do they act con- "ſiſtently with their own or the publick Intereſt?

378. "When therefore the following Pages will "make it appear, with how little Trouble and without "any Expence, the Owners may come at their Riches "with Safety to their Lives, thoſe who ſhall hereafter "doom them to the common Death, muſt be altogether "without Excuſe.

379. The

379. "The Method I have purſued with ſo great Succeſs for many Years, and now recommend to the Publick, as moſt effectual for preſerving Bees in common Hives, is Incorporation, or uniting two Stocks into one, by the Help of a peculiar Fume or Opiat, which for a Time, will put them entirely in your Power to divide and diſpoſe of at your Pleaſure; yet know, that Dominion over them will be but of a ſhort Duration, therefore you muſt be expeditious in the Operation.

380. But, before you enter upon Action, and that you may proceed prudently with Safety and Succeſs, it will be neceſſary to premiſe and obſerve as follows, *viz.* You muſt know the Queen, or commanding Bee perfectly well, which you are immediately to ſearch for among the Multitude, to apprehend and impriſon, returning her no more to her beloved and moſt loyal Subjects: Search for her among the Bees which you deſtroy by Brimſtone, whereby you may learn to know her.

381. "No new Swarms or Stocks ſhould be thus united, except very late ones, and Caſts which have not gained a ſufficient Quantity of Honey for their Winter Store; ſuch I always unite to ſave their Lives: Hives, or Stocks, which have ſwarmed once or twice, conſequently reduced in their Numbers, are the fitteſt to be joined together, which will greatly ſtrengthen and improve them.

382. "Nevertheleſs, if you have a Stock both rich in Honey and full of Bees, which you are deſirous to take, it is but dividing the Bees into two Parts, and putting them into two other Hives inſtead of one.

383. "I muſt add one Precaution more under this Head, *i. e.* Examine firſt that Stock to which you deſign to join the Bees of another, whether there is Honey enough in it to maintain the Bees of both: It ſhould be full twenty Pounds in Weight, the heavier the better.

384. "The

384. "The Way thus prepared, I muſt now lead "my Readers into an intricate Path, to which I "take it for granted, they are perfect Strangers. And "tho' it hath many Windings and Meanders in it, yet "having travelled it myſelf ſo often, and with ſo much "Safety and Advantage, I doubt not but to conduct o-"thers thro' it to their Satisfaction: Provided they di-"ligently obſerve the following Directions.

385. "I am firſt to inform them what the Materials "are, and after that the Manner of Operation.

386. "The narcotick or ſtupifying Potion is only the "Fume of the *Fungus Maximus*, or larger Muſhroom, "commonly called by the Name *Bunt*, *Puckfiſt*, or "*Frogcheeſe*: It is as large or larger than a Man's "Head. I had one of theſe brought me the laſt Sum-"mer, unripe and white, which weighted ſome Pounds, "but when ripe, of a brown Colour, and turning to "Powder, they are exceeding light.

387. "Shepherds and Herdſmen, *&c.* frequently find "them in the Fields, and will ſupply you with them "towards the latter End of the Seaſon.

388. "When you have procured one of theſe Pucks, "put it into a large Paper, preſſing it down therein to "two Thirds or near half the Bulk, tying it up very "cloſe, put it in an Oven ſometime after the Houſhold-"Bread is drawn, letting it continue all Night; when "it will hold Fire, it is fit for your Uſe, in the Method "following.

389. "With a Pair of Ciſars, cut a Piece of the "Puck as large as an Hen's Egg, (better at firſt to have "too much than too little) and fix it to the End of a "ſmall Stick ſlit for that Purpoſe, and ſharpened at the "the other End, which place ſo, that it may hang near "the Middle of an empty Hive: This Hive you muſt "ſet with the Mouth upwards, near the Stock you in-"tend to take, in a Pail or Bucket: This done, ſet "fire to the Puck with a Candle, and immediately place "the Stock of Bees over it, tying a Cloth round the "Hives, which you muſt have in Readineſs, that no

"Smoke

" Smoke may come forth: In a Minute's Time, or lit-
" tle more, will you, with Delight, hear them drop like
" Hail into the empty Hive. When the major Part of
" them are down, and you hear very few fall, you may
" beat the Top of the Hive gently with your Hand, to
" get as many out as you can: Then closing the Cloth,
" lift it off to a Table or broad Board prepared on Pur-
" pose; and knocking the Hive against it several Times,
" many more will tumble out, perhaps the Queen a-
" mong them, as I have often found her lodging near
" the Crown, she often falls one of the last.

390. " If she is not there, then search for her among
" the main Body in the empty Hive, putting them
" forth upon the Table: If you discover her not be-
" fore.

391. " During this Search, you must proceed after
" the same Manner with the other Hive, with which
" these are to be united. No sooner are these Bees
" composed and quiet, and you have found and secur-
" ed the Queen, but you must put the Bees of both
" Hives in one, mingling them thoroughly together,
" and sprinkling them at the same Time with a little
" Ale and Sugar, putting them among the Combs of the
" later Hive, and shake them down in it. When they
" are all in, cover it with a Cloth, bound close about
" it, and let them stand all that Night and the next
" Day shut up, that a Bee may not get out; sometime
" after, you will be sensible they are awaked out of
" Sleep. The same Night would be best to put them
" in their proper Place, and if you had another Garden
" wherein to fix them, I would choose it myself, and
" recommend it to others.

392. " The second Night after the Union, in the
" Dusk of the Evening, move the Cloth from the
" Mouth, taking Care of yourself, and they will with a
" great Noise immediately sally forth, but being too
" late to take Wing will go in again: Then putting in
" two Pieces of Tobacco Pipes to let in Air, stop them
" close in together as before, and keep them so for three or

" four

" four Days longer, after which you may leave the " Door continually open.

394. " But in getting away the Cloth, you muſt uſe " Diſcretion and Caution, ſince they will for ſome Time " reſent the Affront and offenſive Treatment.

395. " The beſt Time of the Year for Union is after the " young Brood is all out, and before they begin to lodge " in the empty Cells, which they do in great Numbers " in cold Weather, and the Winter Time, tho' Mr. " *Ruſden* denies it.

396. " As to the Hour of the Day, I would adviſe " young Practitioners to do it early in the Afternoon, " that having the greater Light, they may the better find " out the Queen. The few Bees left in the Hive ſuffo- " cate with Sulphur. I never knew ſuch combined " Stocks conquered by Robbers, and they will either " ſwarm the next Summer, or yield you an Hive full of " Honey. A little Practice will make you perfect, and " one View of ſuch an Operation, would form a more " perfect Idea of the whole Tranſaction, than what the " ableſt Pen poſſibly can." So far Mr. *Thorley*.

397. I now proceed to the Account given by the Author of the Natural Hiſtory aforementioned, concerning the Manner of taking the Honey and Wax out of the Hives without deſtroying the Bees.

398. " *Clar*. Our laſt Converſation put me in Mind of a " Reflexion I have often revolved, *viz*. That there are " few Creatures upon Earth, but have their Antagoniſts " among other Species of Animals; and that Man is the " general Opponent of them all. He looks upon him- " ſelf as their King, and accordingly uſes a tyrannick " Sway over them. He imagines that the whole Earth, " with all the Things contained therein, was made for " his Uſe only; that he has an uncontroulable Right of " Life and Death over all Things who breathe. Me- " thinks 'tis whimſical enough, that Man, when he " eats his Ox or Sheep, ſhould imagine he poſſeſſes him- " ſelf of a Thing to which he had a juſt and lawful " Title.

399. " *Eugen.* The Lion may, with equal Juſtice, " fancy himſelf empowered to feed upon Man, and " the Wolf on Sheep. But 'tis my Opinion, that " 'tis neither the one nor the other could find any " other original Title of their Sovereignty, than Force " or Cunning. But let us engage no farther in a Que- " ſtion, as this would raiſe up a Multitude of Gainſay- " ers, whoſe Intereſt it would be to differ from us in O- " pinion. I ſhall only obſerve, that, if our Anceſtors " were Uſurpers of the Empire, they obtained over " Brutes; long Poſſeſſion has given us a Sort of Title " to this Sovereignty: But yet this will not permit us " to exerciſe ſuch a Power any otherways than with " Oeconomy, Prudence, Temperance and Diſcretion. " Beſides the Right we claim over their Perſons, we " have others, (and theſe ſeem better founded) on the " Things belonging to them. Some Creatures have " ſuch a Superfluity as would be utterly loſt; wherefore " then ſhould we not take Advantage of it? This ſe- " conding the Views of Nature, who ſeems to offer " them us. Hens lay a greater Number of Eggs than " are neceſſary for the Propagation of their Species. " Cows give Milk with ſuch a Profuſion, as plainly " ſhews that all was not deſtined as Suſtenance for their " Calves. Sheep let us ſhear their Wooll, which after- " wards grows again. Bees have the Art of renewing " their Wax, whenever they are diſpoſſeſſed of it. Let " us therefore divide thoſe ſeveral Things with them, " but then let us imitate on theſe Occaſions, good " Kings, who exact no more Contributions from their " Subjects, than what may enable ſuch Monarchs to " compenſate for theſe by adminiſtring Juſtice to their " Subjects, by indulging them Protection and procuring " them Plenty. We behave thus towards ſuch Crea- " tures as are kept in our Yeards; Why then ſhould Bees " only find the Effects of our Cruelty? We deſtroy e- " very Year, in ſeveral Provinces of the Kingdom, and " eſpecially about *Paris*, a great Number of Hives, and " this merely for Deſtruction Sake. In the Places I am

" ſpeaking of, a Cuſtom equally ridiculous and cruel
" prevails. The Perſons hinted at, employ no other
" Method in order to get the Honey and Wax out of the
" Hive, than to kill all the Bees who inhabit it. For
" this Purpoſe they make a Hole in the Ground large
" enough to receive the Bottom of the Hive. In the
" Bottom of the Hole, Raggs ſmeared with Brimſtone
" and ſet on Fire are thrown. The Hive is ſet on the
" Vapour, when immediately ſo much Earth is drawn
" round it as may ſuffice to prevent the Bees, and even the
" Smoke from getting away. The Stench of the Brim-
" ſtone with which the Hive is inſtantly filled, ſoon
" ſtifles all the ill-fated Bees. There are other Kinds
" of Death, the Invention whereof various Authors
" thought meritorious; but which I think is a Merit to
" conceal. In the Places where this Practice equally
" unskilful and barbarous is uſed, People apologize for
" themſelves by declaring, that they deſtroy on theſe
" Occaſions none but old Bees, from whom no farther
" Harveſt can be expected; Bees who would furniſh no
" more Swarms, but would eat during the Winter-Sea-
" ſon, a conſiderable Quantity of the Honey ſtored up
" by them. In this Manner would a Tyrant argue,
" who, after he had cut to Pieces all the Inhabitants of
" one of the Cities, merely for the Sake of Plundering
" their Gold and Silver, ſhould endeavour to juſtify his
" monſtrous Cruelty, by declaring, that all the Inhabi-
" tants were very ancient, and incapable of furniſhing
" Poſterity next Year.

400. " *Clar.* This is a perfect Picture of the Avarice
" with which Man is fired. All his Arguments, as well
" as his Conduct, are big with Horror. Whenever I
" ſee Injuſtice and Cruelty go Hand in Hand, I con-
" clude from thence, that they are led on by Avarice,
" and I am ſeldom or never miſtaken in my Conjec-
" tures.

401. " *Eugen.* Your Reflexion, *Clariſſa*, is exceed-
" ingly juſt. Who told the Perſons hinted at as above,
" that all the Bees in an Hive are old. We ourſelves

" have

" have ſeen when a Swarm was iſſuing forth, that it
" conſiſted of old and young Bees; and that many of
" both Sorts remained in the abandoned Hive. When
" the *Goths* and *Saxons* ſent Colonies into *Gaul*, did they
" leave in their own Country none except old Men
" who were unable to get Succeſſors? Hives recruit
" themſelves perpetually like Cities and Governments.
" Tho' the Bees of an Hive happen to be deſtroyed by
" ſome Accident, yet many exiſt eight or ten Years.
" I know a Peaſant who preſerved an Hive above 30 Years.
" The Murderers abovementioned add, that Bees would
" devour during Winter all the Honey ſtored up by
" them. But this is another Argument dictated by A-
" varice, which ever miſtakes its true Intereſt. It
" muſt be confeſt, that our Inſects would eat the great-
" eſt Part of ſuch Honey, and perhaps all; ſince they
" hoard it up merely as Proviſion for themſelves. But
" does it not argue more Wiſdom in us, to be contented
" with taking away a Portion at different Times, and in
" various Seaſons of the ſame Year, as is the Practice
" in many Countries, than to carry off the Whole at
" once? By what Name would you call a Peaſant, who
" would kill his Goat, merely that he might at once
" take all the Milk contained in the Bladders of that
" Animal?

402. " *Clar.* How delighted am I to hear you con-
" found Covetouſneſs, and undertake the Defence of In-
" nocence, in Oppoſition to Oppreſſion and Tyranny!
" Would I could enact Laws, a dreadful Proclamation
" ſhould then be publiſhed againſt Bee-cide.

403. " *Eugen.* There is really ſuch an one. *Alexander*
" *de Montfort*, whom I before mentioned, cites a Law,
" enacted by a grand Duke of *Tuſcany*, forbidding all
" Perſons to put Bees to Death upon Pain of being pu-
" niſhed arbitrarily.

404. " *Clar.* Delightful Prince! How juſtly did he
" deſerve to command over others? Why was not this
" laudable Example imitated by all the Monarchs upon
" Earth? Myſelf will make ſuch an Injunction, and
" cauſe

" cauſe it to be publiſhed throughout the whole Extent " of my little Territories.

405. " *Eugen.* This will be well, but then you at " the ſame Time muſt reſtore another Practice, I mean " the gentler Method of taking away the Wax and Ho- " ney.

406. " *Clar.* 'Tis from you that I expect to be taught " this.

407. *Eugen.* " When a Perſon has uſed his utmoſt En- " deavours to preſerve Bees, and to multiply and pro- " duce large Harveſts from them, ſuch an one may juſt- " ly expect to ſhare the Fruits of their Labours with " theſe Inſects, I ſay, divide it with them, and not ſeize " upon the whole, and butcher them at the ſame Time. " This ſharing or dividing with the Bees is performed " by only cutting of ſome Proportion from every Hive: " ſuch is the Cuſtom in ſeveral Countries where they " are cut in different Seaſons. In ſome this is done at " the End of *February*, or in the Month of *March*; " we then may without injuring the Bees, take away a " conſiderable Quantity of their Wax, and at the ſame " Time of the Honey remaining of their Winter-hoard. " There needs no more be left them than what may be " neceſſary for Support, during the inclement Days be- " tween the End of Winter and *May*, we may alſo take " out ſeverals of their Combs, which are empty of Ho- " noney, particulary thoſe, the Wax whereof is grown " too black. What is thus taken away from Bees at a " Time, when they have an Opportunity of recruiting " it ſoon, is a Superfluity which ſo far from injuring, " gives them more Room, and an Opportunity of mak- " ing new Work. However, as the Time for this O- " peration differs in many Places, it muſt vary accord- " ing to the different Provinces or Countries, and ac- " cording to the more or leſs Clemency of the Seaſons. " Our Harveſts are not all gathered in the ſame Month. " In Proportion as the Flowers ſpring forth, or are kept " back, the Labours of the Bees are either forwarded

" or

" or retarded. In ſome Provinces the Honey-combs
" are not cut till *July* or *Auguſt*.

408. *Clar.* " This Article, of cutting the Honey-
" combs, ſeems to be a very bold Attempt. D'ye
" know, *Eugenio*, that, ever ſince I have kept Bees,
" I never had the Courage to be preſent on ſuch Oc-
" caſions?

409. *Eugen.* " D'ye think you'll dare to liſten to the
" Deſcription of it? 'Tis a Military Expedition, and
" one of the boldeſt, to carry off, from the Inſide of an
" Hive, Honey-combs which Thouſands of Bees, ſtrong-
" ly armed, are always prepared to defend. And, in-
" deed, he who engages in this Interprize, ſhould be
" armed *Cap-a-pee*. He muſt uſe the ſame Precaution
" obſerved by your Gardiner, when he took a Swarm
" from a Tree, in order to remove it into an Hive, I
" mean, that he muſt well cover his Face, his Hands
" and Legs, nevertheleſs ſome *Peaſants*, as I obſerved
" before, uſe none of theſe Precautions. With regard
" to the Time of Day fit for this Operation, ſome con-
" clude Noon to be the beſt; from a Suppoſition that
" the greateſt Part of the Bees are then in the Field.
" However, I would not adviſe any Perſon to truſt to
" this. About Twelve at Noon, during the hot Days,
" the leaſt Work is done by the Bees; and conſequent-
" ly moſt of theſe Inſects are then in the Hives. In
" caſe the Noon of temperate Days is choſen, the more
" Bees there are abroad, the greater Number will be re-
" turning home every Inſtant. All theſe little Inhabi-
" tants, exaſperated to find, at their Return, their City
" demoliſhed, and their Poſſeſſions plundered, will haſt-
" en to Vengeance, and the enraged Squadron will not
" give Quarter to the common Enemy: Others are of
" Opinion, which is alſo mine, That the beſt Time is
" the Morning, as our Inſects are then ſtill pinched by
" the Cold of the preceeding Night. To quiet the
" Bees the more, and make them leſs furious, the
" ſmoking them will render theſe Inſects yet more
" ſenſeleſs: To effect this, the Hive muſt be liſted up

" 2

" a little, when the Smoke of a Rag, held in ones " Hand, being introduced; this makes the Bees giddy, " and forces them to move towards the Summit of the " Honey-combs. We then ſeize the Inſtant, and turn- " ing the Hive Side-ways, laying it on a Chair, or Bench, " of ſuch a Height, as may facilitate the intended O- " peration. And now, a ſingle Glance directed to the " Hive, ſhews, at once, what Combs are fit for cutting. " Then with a Knife, whoſe Blade bends like that uſed " for cutting Vines, we pare away whatever may be " thought proper. The Survey of ſuch Combs as are " full of Honey, and thoſe which are very old, deter- " mine the Operation where to cut, and either to take " whole Combs away, or only Parts. In a Word, 'tis " allowed to be juſt in ſome Meaſure, and even neceſ- " ſary, to leave the Bees about Half their Honey. 'Tis " proper to keep the Rag burning during the whole O- " peration, and to let its Smoke deſcend in the Hive, " in order to keep the Bees in.

410. *Clar.* " All theſe Precautions are extremely " ſeaſonble; but do not the Perſons, who thus take a- " way Honey and Wax, run the Hazard of carrying " off and deſtroying, at the ſame Time, a great Num- " ber of little Worms, or Maggots, which might ſoon " have turned to Bees.

411. *Eugen.* " Your Obſervation is quite right, this " being an Error which many, thro' Careleſneſs, often " commit. However, a little Experience in Honey- " combs, in diſtinguiſhing thoſe whoſe Cells are ſhut, " and, among theſe, the being able to diſcern ſuch as " are Store-houſes of Honey, from thoſe which contain " *Nymphæ*, will prevent our committing any Miſtakes " on this Occaſion. By firſt breaking off a little Piece " from the Honey-comb, and examining its Cells, we " eaſily diſcover whether any Worms, *Nymphæ* and " Eggs, are incloſed in them, in which Caſe we muſt " not touch them. Some Authors adviſe us, to cut " ſuch Combs only as are towards the Back of the Hive; " but this Rule is too general. The beſt is, to pitch

" upon

" upon ſuch Combs as are fulleſt of Honey, After hav-
" ing taken what we think proper from an Hive, we
" then ſet it in its Place again. That Side, whence
" the largeſt Quantities have been taken, ought to be
" ſet forward; *that is*, to be moſt expoſed to the Sun;
" the Bees chuſing rather to work on this Side. Some
" Perſons have thought upon an Expedient on theſe
" Occaſions; and which is judged by them as a *Medi-*
" *um*, between the Deſire of taking the Produce of a
" whole Hive, and the Cruelty of putting all its In-
" habitants to Death. The Expedient I here mean is,
" The removing the Bees of a full Hive into an emp-
" ty one. However, this Practice is not convenient ex-
" cept in the Spring, and during Seaſons when the Fields
" may abundantly furniſh Bees wherewithal to repair,
" with Speed, the Loſſes they thus ſuſtain. Never-
" theleſs by this Practice, the Eggs are deſtroyed,
" which is always a conſiderable Loſs, and conſequently
" ſhould be prevented as much as poſſible. I know but
" one Caſe in which this is abſolutely requiſite, and that
" is, When the falſe Moths are multiplied to ſuch a
" Degree in the Hive, that the ſafeſt Courſe the Bees
" can take, is to abandon it to them."

412. Now you have Mr. *Geddie*'s, the *French* Au-thor's, Mr. *Thorley*'s, and the more common Method of coming at the Honey and Wax, conſider well, weigh Circumſtances carefully, and chuſe which of them you will. I wiſh you Succeſs.

413. Before I conclude, I ſhall offer two Recepts for making Mead, take alſo which ever of them you think beſt. The firſt by Mr. *Thorley* is,

414. How to make Mead not inferior to the beſt of foreign Wines.

415. Put three Pounds of the fineſt Honey to one Gallon of Water, two Lemon-pills to each Gallon; Boil it half an Hour, well ſcummed, then put in while boiling Lemon-pill; work it with Yeaſt, then put it in your Veſſel, with the Pill, to ſtand five or ſix Months, and bottle it off for your Uſe.

416. *N. B.* If

416. *N. B.* If you chuſe to keep it ſeveral Years, put four Pounds to a Gallon.

417. The ſecond by Dr. WARDER, tho' I have not kept ſtrictly to his Words, is, how to make *Engliſh* Canary no way inferior to the beſt of *Spaniſh* Wines:

418. One hundred and twenty Pounds will make a Barrel of very good Mead; but if you make it of clear Honey; your beſt Way is to allow four Pounds to every Gallon of Water; mix the Honey and Water in a Copper, then boil it an Hour, and ſcum it well; which Scum ſtrain thro' *Hippocrates's Sleeve*, or a taper'd Bag made of Swan-ſkin, (fine thick Flannel) with a Hoop at the wide End, letting the narrow End come to a Point. This Bag will make it as fine as the other. When your Mead is almoſt cold, tun it up, clay it down, and let it ſtand till it is fine and old enough to drink, which will be ſooner or later, according to the Seaſon of the Year in which it is made, and the Weather that comes thereafter. This Liquor is one of the choiceſt and moſt wholeſome Wines in the World, and exceeding fit to be made uſe of in Poſſets and as Canary. Thus uſed, 'tis impoſſible to know whether the Poſſet was made of Mead or Canary.

419. If you make Mead of the waſhing of Combs, or of Honey from the Combs; then you muſt diſſolve it in warm Water, till an Egg will ſwim in it the Breadth of a Shilling. In this Caſe you muſt be careful that, before you break your Combs into the Sieve or Strainer, you ſeparate all the young Bees, which you may eaſily know from the Honey, as alſo, the Sandrach or Bee-bread, which is a yellow Subſtance, with which ſome of the Cells will be full. Theſe would give your Mead an ill Taſte. Then proceed to boil, ſcum, and tun as before directed. It is beſt to keep the Mead till it is a Year old. If it is made, as adviſed, and of clear Honey, it will keep as long as you pleaſe. I have ſome of it almoſt nine Years old, ſays Mr. WARDER.

420. You ſee the *Doctor* has given his Opinion, that this is one of the choiceſt and moſt wholſome Wines in the

World. Yea, who doubts, but the Products of a Country where Men are born and bred up, are more friendly to their Conſtitutions, than thoſe of Outlandiſh Soils in diſtant Climates. Yet, ſo vitiated and corrupted are our Taſtes, ſo inordinate our Deſires for foreign Liquors, and ſo infatuated are we, as, acting contrary to our true Intereſt, and even common Senſe, to reliſh no Liquors, but ſuch as bring Diſeaſes and Poverty on us together.

421. What can be more unreaſonable than to bring Brandy, made of liquified Tartar, (the Lees or Dregs of Wine) from *France*; poiſonous Gin, with which Rum is commonly mixt before it comes to our Hands, from *London*; and Wine, often adulterated, from ſeveral remote Countries? I ſay, what can be more contrary to the Dictates of Reaſon, than to bring Home *French* Wine and Brandy, (which can only be purchaſed with Caſh, and which Occaſion innumerable Perjuries, which draw down the Wrath and heavy Judgments of the Almighty upon the Land) when we can have pure and good Liquors, natural to our Conſtitutions, made of our Honey, our own Grain, and other Products of our own Soil.

422. Is any foreign Wine often refined with poiſonous or bad Things, tho' it were got in Exchange for our Manufactures, pleaſanter or better than *Britiſh* Canary, (Mead) made of pure Honey? Let ſuch as have not drunk more foreign Wine than Mead determine this Queſtion, their Taſte being unvitiated: Or, is the firſt ſo wholſome as the laſt? How many lamentable Deaths, occaſioned by drinking of foreign Wines and Spirits, have happened to the Knowledge of every one of us? What Numbers of foreign Wines and Brandy Drinkers do we ſee daily tortured with the Gout, and other violent and inveterate Diſtempers?

423. Are Poſſets, which we generally like well when made of foreign Wine with the additional Expence of Sugar, ſo good and wholſome as ſuch made of Mead which needs no Sweatening? I have heard the Doctors ſay, That Colds are the Inlets to, and lay the Foundation of Conſumptions, and moſt of the Diſeaſes we are

ſubject

ſubject to. Honey Drinks and Mead Poſſets are, I'm informed, ſovereign Remedies for theſe Diſtempers.

424. Surely we are a deluded People! we deſtroy both our Perſons and our Purſes to pleaſe our vitiated Palates; and we are like to continue wilfully blind to our own Intereſt, until we are in a State of Miſery irretrivable. Nothing, which I can ſee, can keep us from it, but Manufactures carried on, immediately and vigourouſly, upon Husbandry, which is their only ſure Foundation. This is indeed a certain Way to prevent it, but let us not forget, let the Impreſſion be ſtrongly fixt, that this is the only Way.

425. Unleſs our Fiſhery was like to do well, I ask every Man what can prevent our Ruin, but Husbandry and Manufactures encouraged by Home Conſumpt? Yea, the Conſumpt of every Family in the Kingdom will be found neceſſary, and the Demands of every Family ſhould, no doubt, be reſtricted, to ſuch Articles as our Husbandry and Manufactures produce. Could this be brought about, we ſhould yet become a rich and a happy People. Our contrary Behaviour ſhews, that we are infatuated, and gallopping along the high Road to Deſtruction.

426. I have heard it ſaid, That the Quakers have a Law or Maxim among them, to buy only from one another, but to ſell to all the World. Well would it be for us, if every *Scotſman* was of the Principle juſt mentioned, with reſpect to the Products of our own Soil, and the Manufactures of our own Country.

427. Would the Great and the Rich lead the Way, and perſevere, lower Ranks would follow. Nothing ſeems plainer than that the Calamities of a Nation, tho' they fall moſt ſenſibly on the poorer Sort, ly nevertheleſs heavieſt upon Men of Eſtates at laſt; they having moſt to loſe. The Tenant's Loſs is really the Landlord's.

428. Let Landlords only remember, that the Value of their Eſtates depends abſolutely on the Condition and Circumſtances of the Tenants. If this certain Truth

was

was but confirmed in their Minds, then they would eaſily find out how deeply they are concerned in this Matter, and how much it is their Intereſt to encourage and promote Husbandry and Manufactures, not only by Home Conſumpt, but by every poſſible Way: And I think I may obſerve that many of them would ſtay more at Home for that Purpoſe.

429. A Child touched by a ſingle Spark, will dread the Fire and keep off it; but the Nation, it appears, ruined byf oreign Commodities, will not abſtain from them, and even thoſe who have no reaſonable Call to go abroad, will not ſtay at Home and ſpend their Money, when ſtaying at Home and abſtaining from foreign Commodities would make the Kingdom rich and happy; and when the Products of the Land and our Manufactures are indiſputeably good, and may well ſerve the greateſt. I leave it to every Reader to make his own Reflexion upon this. If I made one, I might probably diſoblige many.

430. How many have died chearfully and glorioufly for the Sake of their Country? Will we continue to gratify our vitiated Taſtes, and fooliſh Fancies to the Ruin of ours? Will any *Scotſman* have the Aſſurance to call himſelf a *Patriot*, who, having no neceſſary Cauſe for living out of the Kingdom, drains it of its Coin, by ſpending his Rents abroad, or who by the uſe of foreign Commodities, undermines our Husbandry and Manufactures? Theſe who encourge and ſupport them, and ſome ſuch even of the greateſt Diſtinction we have, thereby prove themſelves to be *Patriots* indeed, and they have the beſt and a juſt Title to the glorious Epithet. May the Number of ſuch encreaſe daily: May they be always favoured and employed by the Crown, as they will be the Darlings of the People: When Death ſhall deprive us of the Bleſſing of any of them, may their Places be filled with Men as like them as poſſible, and may the Merit of the Dead be always faithfully recorded in Hiſtory, that Honour and Praiſe may be paid to their Memories by all ſucceeding Generations.

APPEN-

APPENDIX.

I Purpoſed to have ended my Book as in the preceeding Page, yet I am excited to offer this Addition. I find my Performance gives not univerſal Content: I'm ſorry for it: But how could I expect it would ſince no Book ever did, or I believe ever will? For who can be ſo exact as not to fail ſometimes? And even when there is no Failing, there's no eſcaping the Cenſure of bad Judges, of whom there are many. I have ſomewhere read,

All human Race would fain be Wits,
But Millions miſs for one that hits.

Now, ſince an Opportunity offers, the printing of my Book being not quite finiſhed, I ſhall firſt tell you how I came ſo early to the Knowledge of the Exception, next what it is. Then I ſhall venture to ſay a little for myſelf; and, laſt of all, ſubmit to every candid Reader if the Cenſure is not unreaſonable.

My

My Performance was not ready for the Preſs till near the End of *February*, when the Printers are more hurried, by Buſineſs of the Court of Seſſion, than at any other Time of the Year; ſo, ſince it could not be publiſhed till the Vacation, when the numerous Attendants on the Seſſion, the moſt probable Purchaſers, go out of Town, I was adviſed to put Copies of the firſt Sheet, as a Specimen, into the *Coffee-Houſes*, that my Deſign might be known, and ſpoke of before they went. This I complied to, for I thought it might let me, by the Information of Friends, into People's Sentiments concerning the Work before it was finiſhed: Some for the ſame Reaſon had Acceſs to the other Sheets as they were caſt off, and thus I have in Part gained my End. For,

One of a Company at a *Coffee-Houſe* Table, lifting up the firſt Sheet, ſaid, "Have ye read that Gentlemen? "Yes, *ſaid one*, I have, and I wiſh the Stock may an- "ſwer the Sample. I have read, *ſaid he who opened the* "*Diſcourſe*, three Sheets of four of it, which a Friend "put into my Hand, and I tired. The Book might, I "doubt, not be uſeful, but, alas! the Stile is ſo poor, "mean and low, that 'tis apt to put one aſleep, 'tis all "lifeleſs Matter, it has no Embelliſhments, nothing en- "tertaining and enlivening; Who will ſpend their "Time upon ſuch a heavy Piece, that has read the Na- "tural Hiſtory of the Bees, Nature diſplayed, or any "Thing ſprightly wrote on that curious and fruitful "Subject? Not the young and lively: None, I dare ſay, "but dull unfaſhionable People, or old out of the World "Folks.

"Why, *replied the other*, was not the Honey ton- "gued *Virgil* the firſt in your Liſt? But pray explain "yourſelf, Do you cenſure, or do you praiſe? If the "old, experienced, and wiſe read the Book, will it not "be becauſe they find in it profitable Inſtructions in "plain eaſy Language, without Excurſions into extra- "vagant Narratives, which divert the Mind of the Rea- "der from Attention to the uſeful Parts? If I may be "allowed to offer my Opinion, it is, that I find out the

"Author's

" Author's Sentiments eaſily. What other Manner of " Expreſſion do we want, in a Book wrote for Inſtruction " not for Amuſement? I ſuppoſe he meant not to write " a Novel."

Novel, No! I believe he did not, *anſwered the Objector, with a Sneer*, and then liſting the Paper read from it. *In the Natural Hiſtory mentioned, a Dialogue betwixt* Eugenio *and* Clariſſa; Eugenio, *ſays he, opened the ſovereign Bee anatomically, and aſſiſted* Clariſſa *by his Glaſs, to ſee that ſhe the ſovereign Bee is the fruitful Mother, that the Drones are the Males, and that the working Bees are of no Sex: Dr.* WARDER, *ſays they are Females: What ſhall we believe?* " So, *continued he*, he " leaves the Matter, and is not this ſillily told? More, " *ſaid he*, I add not at the Time, but only this: The " Difference betwixt Things are beſt known by Compa- " riſon: Read the Natural Hiſtory upon the very Oc- " caſion, there you'll obſerve how beautifully and how " naturally the Author makes his *Eugenio* and *Clariſſa* " expreſs themſelves, and then I ſubmit the Matter to " yourſelf. All fair, *ſaid the other*, and ſo can I to " you, but here we have very proper Judges."

This Controverſy, which ſhews that, as I have ſaid, there is no pleaſing every Body, has diſpoſed me, ſince others may be of the ſame Opinion with the *Objector*, to inſert the Converſation which he praiſes ſo much, that ſuch as like it may find it here, and that every Reader may judge, whether I did right to take the Way I have taken, or would have done better if I had followed his Example.

Eugen. " The remaining Queſtion is to know how " this Queen behaves to become a Mother? How ſhe " acts with her Hundreds of Husbands? How ſhe con- " ducts in her numerous *Seraglio*?

Clar. " I impatiently expect the Particulars; I ima- " gine the gallant *Anecdotes* of the Mother Bee would " make a very entertaining Hiſtory. Having examin- " ed, as you have done theſe with ſo penetrating an

" Eye,

" Eye, I make no Doubt you have ſurprized the Queen " throwing her Handkerchief."

Here I paſs over betwixt three and four Leaves, and you may gueſs I have Reaſon, when *Clariſſa* was brought to tell *Eugenio*, *You are lucky that I'm not diſpoſed to quarrel, I know as much of this Article as I am deſirous of knowing*. But I hope I may be excuſed for inſerting that very Part, which the Gentleman made Uſe of; for 'tis natural for every Man to defend, and to paſs a right Judgment, you muſt have his Evidence as well as mine before you.

Clar. " Now open the Body of a working Bee, that I " may have no Doubt of the different Species.

Engen. " Here is one. You ſee here the Canal for Ali- " ments; a firſt Stomach which contains the Honey; " a ſecond Stomach and the Inteſtines filled with Crude " Wax: But beyond this, you obſerve no Part analo- " gous to the *Ovaria*, nor any Thing that reſembles, or " that one can even ſuſpect to be Eggs: Moreover you " ſee no Part which has the Appearance of being that of " the Males or Drones.

Clar. " That is true, I ſhall however raiſe one Ob- " jection. How are you ſure that there is in one Hive " one only Female; that what you call Drones are all " Males; and that the working Bees are without Ex- " ception of neither Sex: To conclude, that the Bees " are all each in their Kind, ſuch as you have opened? " It appears to me very difficult to verify this exactly.

Eugen. " The Certainty of it is very ſimple and eaſy. " You have only to devote, as I have done, an entire " Hive, to deſtroy all its People, either by Smoke or Water, " and then to examine every particular Bee: It is not e- " ven neceſſary to open them, it will ſuffice to preſs " them between your two Fingers: One can eaſily " make the characteriſtick Parts of the Sex appear in " thoſe which have any; and the Default of that Ap- " pearance will indicate thoſe which have none.

Clar.

Clar. "What Poſſibility is there of reſiſting ſo great "an Evidence? After what I have ſeen there is no Room "for Diſpute, one muſt ſurrender.

Eugen. "To take Advantage of the good Diſpoſition "you are in, I paſs to the Recital of the Mother Bee's "Amours. A Mother Bee, who is the only one of her "Sex found in the Hive, as ſhe is at certain Times "found there with ſeven or eight Hundred, and ſome-"times a thouſand Drones, ſeems to be there in the Midſt "of a very numerous *Seraglio* of Males. They have "however pretended, that ſhe admits none of them to "any Intimacies with her. It is true, that hitherto "no Perſon has ſeen her ſeek their Union, or, at leaſt, "no Perſon has writ that he has ſeen it. But this is one "of thoſe Caſes, wherein a negative Proof cannot have "much Force: For without aſcribing Modeſty to this "Bee, there is no Reaſon to imagine that ſhe quites the "interior Part of the Hive, where ſhe likes to paſs "her Time, and that ſhe endeavours to expoſe her-"ſelf to the Spectators Eyes, when ſhe would permit a "Male to render her fruitful. The Queen of *Achem* is "in the ſame Caſe with the Queen of the Bees, that is, "to have a *Seraglio* of Men at her Command. If then "one of thoſe Travellers, who traverſe the World to "inſtruct themſelves in the Manners and Cuſtoms of dif-"ferent People, ſhould keep himſelf in the Suburbs of "the City of *Achem*, in hopes that the Queen will come "to ſeek him in the Fields, with ſome one of her Fa-"vourites, to make him a Spectator of what Secrets paſs "between them, he would probably wait a great While "to no Purpoſe: And if he ſhould take it in his Head "to conclude, that Men attend this Queen like ſmall "*Bologna* Dogs, only for the Pleaſure of being looked "at, I fancy he would not find many Readers ſo ſimple, "as to believe his Relation. Let us make the ſame In-"ference with reſpect to the Bees. We have it not in "our Power to be Witneſſes of all their Actions. Our "Eyes are not formed to ſee through their waxen "Combs, covered with ſeveral Layers of common Bees.

" But we are certain, it is behind these Combs, that the " Mistery of Fecundation is carried on. Being thus instruct- " ed of the Place where the Operation is performed, no- " thing remains but to know the Time and Manner. The " Time is easy to be known. At the Beginning of the " Spring, open an Hive, you will not find one single " Male: From the Middle of *May* to the End of *June* " you will find Hundreds of them: From thence to the " following Spring you look for them in vain: The " Time therefore of Fecundation can be no other than " when there are Males, that is, about six Weeks tak- " en in the Months of *May* and *June*. With regard " to the Manner how Things pass to cause this Fecun- " dation, 'tis what I myself have seen, and of which I " will give you an exact Account. I found the Secret " to force a Mother Bee to act before me, in the same " Manner she does in the Bottom of her Hive.

Clar. " Hold *Eugenio*, your Virtuosi may have the " Liberty of seeing what is improper for the Ladies to " hear.

Eugen. " There are Ways of Talking to the Under- " standing without shocking the Ears; these Ways I in- " tend to make Use of. Towards the Beginning of *May*, I " took a Mother, who had already given Birth to a great " Number of Bees, and who was willing to give it to " several more. I put her into one of these Glasses " which we use for Powder, where I shut her up with " seven or eight Males. I was curious to observe how " they would behave with her, or she with them. They " were taken from the same Hives, and were some of " her Husbands. They treated her, however, with an " Indifference I did not expect. Near upon two Hours " I left them together, in which nothing passed between " them. Each continued on its Side in a perfect Inac- " tion, as People who would never be acquainted.

Clar. " It seems as if this Experiment is not much to " the Advantage of what you would perswade me to.

Eugen. " When one makes Experiments of this Na- " ture, it is equally advantageous, to know what makes

" them

" them fail, as what ſucceed. This laſt did not ſuc-
" ceed, for the following Reaſons. In order to get this
" Queen Bee, I had plunged the whole Hive into Wa-
" ter, and, by this Means, had taken out the Queen al-
" moſt drowned. Returned therefore in ſo ſmall a Time,
" from the Gates of Death, it is not at all to be won-
" dered at, that ſhe had not thoſe Paſſions, which are
" the Effects of full and perfect Health. Beſides, ſhe was
" in the Middle of her Laying-time, when all Animals
" of both Sexes have no mutual Deſires. Add to this,
" ſhe was not a young Mother; the Condition of her
" Wings proved her Age, as ours is known by the
" Wrinkles on our Fore-heads: Her Wings were notch-
" ed, and the Edges of them ſhivered away. The Obſer-
" vations I was deſirous of making Demanded, therefore,
" that I ſhould ſhut up with ſome Males a Female,
" which, as yet, had no Communication, or very lit-
" tle, with them. Towards the Middle of *June* they
" brought me one, which I had Reaſon to believe was
" ſuch as I wanted. She had been found, that Morn-
" ing, near an Hive, which had ſwarmed the Night be-
" fore. For, as I already told you, there are ſome-
" times ſupernumerary Queens amongſt the Swarms:
" This, I ſpeak of, was one of the Swarm, who, 'tis
" likely, had ſaved her Life by Flight. The good
" Condition of her Wings, and her Colour, made me
" conclude, that ſhe was yet young; aud the Bulk of
" her Body, not ſo great as that of a Female ready to
" lay, ſeemed to prove, that ſhe had no other Eggs,
" but ſuch as were extremely ſmall. I ſhut her up in
" the Glaſs, where I put likewiſe a Male with her,
" which I had ordered to be taken from one of my old
" Hives. I diſcovered the Character of this young
" Queen, as ſoon as ſhe had been put to the Proof.
" I had never ſeen any but Queens, accuſtomed to be
" treated, every Inſtant, by the working Bees, to re-
" ceive from them Preſents of Honey, Thouſands of
" Carreſſes, and a Thouſand little Marks of Eſteem, of
" every Kind. Thus I ſaw, with ſome Surprize, that

" all

" all the Deference, which common Bees have for the
" Mother, the ſame this young Queen had for the
" Drone I had put to her. Not ſatisfied to come near
" him, ſhe delayed not to put out her Trunk, ſome-
" times ſucceſſively to lick different Parts of the Male's
" Body, at other Times to offer him Honey: ſhe turn-
" ed round about him, continually carreſſing him, either
" with her Trunk or Legs. The Drone ſtupidly ſubmit-
" ted to ſo many Endearments, as if they had been his
" Due, nor ſeemed at all moved by them. It ſeemed as
" if it had been Goodneſs in him to ſuffer himſelf to be
" carreſſed: However, at the End of a Quarter of an Hour,
" he ſeemed to be a little animated; and when the Fe-
" male, placed in Sight, full over againſt him, had
" bruſhed, with her Thighs, the Head of this Inſen-
" ſible; and had ſoftly ſet at Play her *Antennæ*; the
" Male was determined, at length, to anſwer her Ad-
" vances, by ſimular ones, of the ſame Nature. The
" Female redoubled her Vivacity, and placed herſelf in
" thoſe Poſitions, which agree not very well with the
" Idea which has been attempted to be given us of her
" Modeſty: It is to make uſe of a weak Term, to ſtile
" theſe Poſitions only immodeſt; they approached to
" ſomething ſuperior, unknown to us: A Superiority,
" which overthrows the general Order of Nature, by
" ſubjecting the more noble Species to the other. All
" theſe Endearments were by no Means unuſeful to this
" paſſionate Queen; her indolent Spouſe became more
" active, he was animated more and more. One might
" ſee, as I did diſtinctly, that many of thoſe Organs,
" which you obſerved within him, when I opened
" the Male, appeared without him. The whole Tranſ-
" action continued three or four Hours, during which
" he found Time for Repoſe, and repeated Acts of
" Love. At length the Drone fell into one, which
" to the Queen ſeemed to be of too long a Duration.
" She was deſirous to draw him from his Lethargy;
" ſhe ſeized him, with her Teeth, by the Corcelet;
" ſhe cheer'd him a little; ſometimes, in order to re-
" freſh him more, ſhe put her Head under his Body;

" but

" but ſo many Marks of her repeated Regard were un-
" uſeful, he was dead.

Clar. " How! what do you ſay?

Eugen. " I ſay he was dead, nor is he the only one
" I have ſeen expire in theſe critical Moments. I fancy
" ſo immediate a Death in ſuch Circumſtances may ap-
" pear to you ſuſpicious, or, at leaſt, an extraordinary
" Event, but the Conſequences were ſo. When I
" knew this little Animal was abſolutely deprived of
" Life, I only thought of conſoling the Widow, and I
" fancied I could no better ſucceed in this, than to pre-
" ſent her another Spouſe young and vigorous.

Clar. " That is to ſay, that you reaſoned on Account
" of this Bee, agreeably to the malicious Principles,
" which Men are poſſeſt of with regard to our Sex.
" Could a Philoſopher of your Caſt have any Taint of
" vulgar Prejudices?

Eugen. " Grant me more Juſtice. I thought of no
" Inference injurious to the Ladies; I was only deſirous
" to treat this Bee like a Brute; but, to my great Aſto-
" niſhment, ſhe behaved like a virtuous Wife. The
" Living did not at all conſole her for the Dead. She
" remained all the reſt of the Day fixed to the Body of
" her unfortunate Spouſe, continued the ſame Cares,
" and loaded him with the ſame Carreſſes, which ſhe had
" conferred during Life. The Widow of *Mauſolus*
" could not better diſcharge her Duty.

Clar. " You begin to intereſt me for this tender Queen.
" I am curious to know her Deſtiny.

Eugen. " You ſhall ſoon be ſatisfied; Night being
" come, I drew from the Glaſs the two Spouſes, the
" Living and the Dead, and ſhut up in their Room an
" hundred common Bees, to keep our Queen warm,
" during the Night. The next Morning, I preſented
" her with a new Husband. I beſtowed likewiſe an-
" other on another Queen, which they had brought me
" to repeat the Experiment. The two Females behav-
" ed in the ſame Manner, in which the firſt had done,
" the Day before, with a Male in perfect Health.

Clar.

Clar. "This ſpoils all. Was then one Night ſuf-
"ficient to cauſe our *Artemiſia* forget her *Mauſolus?*

Eugen. "What is approved among us, let us not
"charge as a Crime to her. We find nothing blameable,
"that a young Widow ſhould admit new Engagements,
"after her Year of Widowhood. One Night with a
"Bee may be equivalent to one of our Years. Time
"ought to be meaſured, according to the Duration of
"Life. An Animal which has but three or four Years
"to live, cannot admit ſo long Interval between two
"Actions as that which has ſixty or ſeventy. Beſides,
"from all you have ſeen, and from all I have told
"you, we have a Right to conclude that, in the Hive
"a Mother Bee acts as that did in the Glaſs; and, con-
"ſequently, that Bees are produced like other Animals,
"and not from Corruption.

Clar. "That appears to me extremely true. But I
"think it no leſs ſtrange, that this Queen ſhould gratify
"the Deſires of her Sex; in a Manner ſo oppoſite to
"natural Order.

Eugen. "This inverſion of Nature ought not to ſur-
"priſe you; it is even neceſſary in this Caſe: For
"when it has been once eſtabliſhed, that a Female ſhould
"cohabite with a thouſand Males, the Conſequence
"ought to be, that theſe Males ſhould be ſleepy, and
"to be awakened only by her; that ſhe ſhould be free
"to chuſe among them all him, whom ſhe would ho-
"nour with her Favours. You'll eaſily conceive what
"Confuſion, what a terrible Situation it would be for a
"Woman, to find herſelf in the Midſt, and at the Mer-
"cy of a Crowd of active, petulant Husbands, who
"would all be Maſters the ſame Moment.

Clar, "You are in the Right; that is eaſily admit-
"ted. The Imagination requires no Aſſiſtance, to pre-
"ſent to itſelf a juſt Image of the Diſorders which
"would reſult from thence.

Eugen. "You now know, *Clariſſa*, how the Mother
"Bee becomes fruitful; you know what puts her in a
"State to people the World with ſo numerous a Poſte-
"rity.

" rity. We ſhall ſee the next Time we meet here, " how ſhe acquits herſelf of this important and labori- " ous Office. "

All I ſhall ſay for myſelf is this: You'll have obſerved I had only ſaid, that the Author of the *Natural Hiſtory* had maintained, *That the Working-bees are of no Sex: Dr.* WARDER *ſays they are Females: What ſhall we believe?* Is not this plain, diſcreet, and modeſt Language? Have I not, in the Manner of Expreſſion, hit upon the Socratic Way of Reaſoning? *Socrates* always inquired, always interrogated, ſays Mr. *Charpentier* and *Byſshe*, in their Accounts of the Life of that great Man; and if you look into the Works of *Plato* and *Xenophon*, you'll likewiſe obſerve, that they tell you, it was, his, their Maſter's Way. But now, as you ſee what the *Natural Hiſtory* ſays, and as Mr. WARDER uſes theſe Words; *After great Pains taken, and curious Obſervations made, with the Help of the beſt Glaſſes, I muſt come to this certain Concluſion, that all the Working-bees are Females*; I do ſay poſitively, that ſuch Glaſſes, or ſuch Accounts, are not to be believed; for the Aſſertions of both theſe Gentlemen cannot be true, and, I think, I may ſay, That the *Doctor*'s Account of the Working-Bees appears leaſt fabulous, and has leaſt of the Air of a Romance.

The Author of the *Natural Hiſtory* has, I think, himſelf yielded in the Introduction to his Book, that it is ſuch, or was intended to be ſuch. He makes *Clariſſa* ſay, *I want nothing of you but a Romance, but the true Romance of the Hiſtory of Bees*; and *Eugenio* to anſwer, *I will endeavour to ſatisfy you, I will relate nothing but what has been carefully obſerved, and well atteſted: There will enter a good Deal of the Marvelous into my Recital, but nothing of the Falſe.* Did you ever read a Romance, wherein the Author did not endeavour to perſwade you, that he wrote nothing but the Truth? And the more romantic his Performance was, did he not take the more Pains to convince, that his Relations were true? but further,

I leave

I leave it to you, my Reader, to determine, if such a luſcious Dialogue as this betwixt *Eugenio* and *Clariſſa*, painting ſuch Images, and giving ſuch a Tincture to the Imagination, tho' it may be thought genteely wrote, be worth the Value of its Dreſs. I apprehend the Author of it and I have proceeded on different Plans, and that this has occaſioned the Difference in our Way of Writing.

His Deſign ſeems to have been, chiefly, to entertain his Readers with eloquent Expreſſions, to ſwell his Book: For what other Reaſon, to give only another Inſtance or two out of many, would he have filled up ſix or ſeven Pages, with the Deſcription of the Eyes of Bees and other Flies, and telling how many Thouſands each Fly hath? The Butter-Fly no leſs than 34650, and, if I take up his Meaning, each Bee as many. I ſay, for what other Reaſon would he have, in another Place, employed five or ſix Pages more, acquainting us of three Sorts of *nameleſs* Flies, *The firſt whereof*, ſays he, *lays its Eggs in the Brains of a Sheep, in ſpite of the ſnuffing and the perpetual Agitation of the Beaſt in queſtion, by finding an Opportunity of gliding into its Noſtrils, where ſhe gets to the* ſinus frontalis. *The ſecond, in the Throat of Stags, by piercing at once, and without Heſitation, thro' the moſt pitchy Gloom, and ſhaping her Way through all the winding Paſſages, leading from the Entrance of the Noſe to the Root of the Tongue.* And the Third, *in a* Mares anus, *by getting under the Tail and gliding till ſhe reach it:* Here he is very particular. *Probably*, ſays he, *the Inſect at firſt excited only an itching, which prompted the* Mare *to force outward the Border or Edge of its Inteſtine; to open it, and widen its Aperture. Our Fly made a proper Advantage of this Diſpoſition, ſhe advancing further and concealing herſelf in the Foldings of the* Anus. *It was then in all Probability, that ſhe finiſhed her Operation and was enabled to lay her Eggs. Soon after this the* Mare *ſeemed quite diſtracted; ſhe beginning to run, caper and prance, and at laſt threw herſelf on the Ground, and it was a quarter of an Hour*, ſays he, *before ſhe was eaſy, and fell to feeding*

feeding again. Beſides, he ſays, *That the Suſtenances ſuitable to the young they are going to bring forth, is found only in the ſaid Places.*

Is not this fine Language to *Clariſſa*? But paſſing this Conſideration, had he been a Diſciple of the Philoſopher, whom the Oracle pronounced the wiſeſt of all Men, and God gave the *Athenians*, ſays *Plato*, to let them ſee their Faults, he would have taught him to have ſpent his Time on more uſeful Matters. *Xenophon* tells us, *That it was his Cuſtom, ſpeaking of Things natural, to ask,* ſuch as employed their Time upon Inquiries only curious, *if they contented themſelves with bare Knowledge without expecting any Profit? And that he,* Socrates, *employed his own Meditations on what was uſeful.* M. *Charpentier* and *Byſshe* before mentioned ſay, *That he profeſſed not a vain and uſeleſs Science, but rendered himſelf uſeful to his Friends and his Country; that he would have Men ſet Bounds to their Curioſities, and that this Doctrine was conformable to that of* Solomon, *the wiſe Man himſelf, who tells us,* "God has delivered up the World to the Diſpu-" tations of Men, not being pleaſed that they ſhould " know the Secrets of his Works." *But that theſe uſeleſs Inquiries agreed very well with the Vanity of thoſe Authors, who being unable to attain to the Knowledge of the Object they propoſed to themſelves, adhered to all the idle Notions their Imaginations preſented them, and gave us their fooliſh Conceits for Reaſons.* Wherefore *Plutarch* ſays, *That* Socrates *having taken Philoſophy out of the Hands of* Pythagoras *and* Empedocles, *who repreſented her full of Chimeras, Fables and Superſtitions, and even playing the downright Fool, brought her to treat of Things with Prudence, and to ſearch for Truth in ſolid and ſubſtantial Arguments; that he left the ſuperfluous to take the neceſſary; and quitted the curious Philoſophy to embrace one that was ſolid and uſeful.* The Author of the Natural Hiſtory's Accounts of the Bee's Eyes, the Queen's Amours, the Flies, and many others in his Book, are, I humbly think, unuſeful. What get we tho' they be

true? Do they contribute to make Honey more plenteous, or to enlarge the Commerce of Wax? But

My Purpoſe was only to inſtruct my Readers, by more and better practical Directions than any Writer on the Subject hath hitherto given, and, I hope, I have not only attained my End, but that my Language will be inoffenſive to the nicer Ear, tho' I have adapted it to the meaneſt Capacity. I have ſtudyied to uſe few Words, (for Brevity is the beſt Help to the Memory) and printed on a ſmall Type, that my Book might be compriſed in a few Sheets, and ſold at a low Price; that ſo the Poor who cannot purchaſe, or the Unlearned who cannot be inſtructed by Books ſwelled with a Redundancy of elegant Expreſſions, may find mine cheap, plain and uſeful to direct them in every Difficulty that can occur: Which I flatter myſelf ſhall make this profitable Husbandry, in the Power of the meaneſt Cottager to practiſe, univerſal over the Kingdom.

FINIS.

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FINIS.

(3)

THE SHEPHERD of BANBURY'S RULES TO JUDGE OF THE CHANGES OF THE WEATHER,

Grounded on Forty Years Experience.

To which is added

A RATIONAL ACCOUNT of the Causes of such Alterations; the Nature of Wind, Rain, Snow, *&c.* on the Principles of the *Newtonian* Philosophy.

By JOHN CLARIDGE.

EDINBURGH:
Printed for JAMES REID, Bookseller in *Leith.*
M.DCC.LV.

INTRODUCTION.

AS we very juſtly eſteem it a fit tribute of admiration to adorn natural curioſities, by ſetting them as richly and as advantageouſly as art can direct, ſo the following obſervations of the ſhepherd of Banbury have appeared to me worthy of being preſented to the eye of the public, with all the luſtre that it was in my power to give them. It is one thing to obſerve, and another to reaſon upon obſervations; and it very rarely happens that both can be taken into the compaſs of one man's life. We ought therefore to conſider it as a very lucky incident, when the obſervations of another man, upon whom we can depend, fall into our hands, and enable us to add natural experience to the notions derived to us from books of philoſophy.

There is a degree of pedantry in deſarts as well as colleges. Men who derive their knowledge entirely from experience, are apt to deſpiſe what they call book-learning; and men of great reading are as apt to fall into a leſs excuſable miſtake, that of taking the knowledge of words for the knowledge of things: whereas there are not any two points more oppoſite in nature, ſince we very rarely ſee, that either true ſcholars are talkative, or that talkative men are true ſcholars.

The ſhepherd, whoſe buſineſs it is to obſerve what has a reference to the flock under his care, who ſpends all his days, and many of his nights, in the open air, and under the wide-ſpread canopy of heaven, is in a manner obliged to take particular notice of the alterations of the weather; and when once he comes to take a pleaſure in making ſuch obſervations, it is amazing how great a progreſs he makes in them, and to how-

great a certainty at laſt he arrives, by mere dint of comparing ſigns and events, and correcting one remark by another. Every thing in time becomes to him a ſort of weather-gage. The ſun, the moon, the ſtars, the clouds, the winds, the miſts, the trees, the flowers, the herbs, and almoſt every animal with which he is acquainted; all theſe, I ſay, become to ſuch a perſon inſtruments of real knowledge.

There are a ſort of half-wiſe people, who, from the conſideration of the diſtances of things, are apt to treat ſuch prognoſtications, as they phraſe them, with much contempt. They can ſee no connexion between a cat's waſhing her face, and the ſky's being overſpread with clouds; and therefore they boldly pronounce that the one has no relation to the other. Yet the ſame people will readily own that the fluttering of the flame of a candle is a certain token of wind, which however is not diſcernible by their feeling; becauſe it lies within the compaſs of their underſtanding, to diſcern that this fluctuation of the flame is cauſed by the wind acting upon it, and therefore they are inclined to believe this, tho' it does not fall actually under the cogniſance of their ſenſes. But a man of a larger compaſs of knowledge, who is acquainted with the nature and qualities of the air; and knows what an effect any alterations in the weight, the dryneſs, or the humidity of it has upon all animal bodies, eaſily perceives the reaſon why other animals are much ſooner ſenſible of any alterations that happen in that element than men; and therefore to him the cawing of Ravens, the chattering of ſwallows, and a cat's waſhing her face are not ſuperſtitious ſigns, but natural tokens (like that of the candle's fluttering) of a change of weather; and, as ſuch, they have been thought worthy of notice by Ariſtotle, Virgil, Pliny, and all the wiſeſt and graveſt writers of antiquity.

But ſtill a few ſlight and trivial obſervations of this kind, and ſuch as are in the power of every man to

make, go but a very little way in furniſhing us with an uſeful knowledge of the indications of the weather. To ſupply theſe, and to have conſtantly at hand the means of judging of theſe alterations, men of great genius have invented, (and wonderful inventions they are!) inſtruments for meaſuring the heat, the cold, the weight, the dryneſs, and the humidity of the air, with great exactneſs, and upon theſe they reaſon as to the changes of weather with great accuracy and certainty. It would undoubtedly be a great folly to pretend to queſtion either the truth of their obſervations, or the uſefulneſs of them: but then we may have leave to conſider how far, and to how great a degree they are uſeful. The thermometer meaſures exactly the degrees of heat; but the air muſt be hot to ſuch or ſuch a degree, before it is diſcerned by this inſtrument. The barometer indicates the weight of the air, and the riſing and falling of the quick-ſilver expreſſes the alterations in its weight with wonderful nicety; but then thoſe alterations are the cauſe of this. In like manner the hygrometer, or hygroſcope, meaſures the drineſs or humidity of the air very plainly and very exactly; but the weather muſt alter, muſt become drier or moiſter than it was, before theſe alterations are viſible; and therefore however ingenious, however curious, however uſeful theſe inſtruments may be in other reſpects, they undoubtedly contribute very little to the prognoſticating a change of weather at a diſtance; and it is from the experience of this, that they are ſo little eſteemed, ſo lightly regarded by the common people.

Our ſhepherd's obſervations are of quite another nature: moſt of them give us a day's notice, many a week's, and ſome extend to ſeveral month's prognoſtication of the changes of the weather: and of how great uſe theſe may be to all ranks and degrees of people, to the ſedentary valetudinarian, as well as the active tra-

veller; to the ſportſman who purſues his game, as well as to the induſtrious huſbandman, who conſtantly follows his labour; in ſhort to every man in every ſituation, in ſome degree or other, is ſo very clear and intelligible, that it would be a mere waſte of words, and a very idle diſplay of rhetoric to attempt the making it clearer. Every man living would be glad to forſee the alterations of weather if he could; and conſequently to moſt people, if not to all, theſe obſervations, grounded on no leſs than forty years experience, cannot but be acceptable.

To make the beſt uſe of one's talent, and to employ the lights derived from the ſtation in which providence has placed one, for the benefit of mankind, is undoubtedly diſcharging one's duty, anſwering the end of our creation, and correſponding with the oeconomy of nature, which does nothing in vain. This propoſition is equally true, let a man's ſtation be what it will. It is the manner in which we perform, and not the character that makes the player; and in this ſenſe what man is not a player? Here then is an inſtance of one who has for many years ſtudied his part, and now communicates his diſcoveries freely. In a phyſician, in a philoſopher, in a mathematician, this would be highly commendable; and why not in a ſhepherd? We do not caſt our own parts in the drama of life; no, this is performed by the great author of nature. He who adjuſted every thing on earth with ſuch beauty and harmony; he who taught the heavenly bodies to move, the ſame diſtributed their reſpective offices to men. May we not therefore ſuppoſe, that every man's part is well caſt, and that our abilities are exactly proportioned to our Stations? If ſo, he who does all he can, does all that ought to be expected from him, and merits from impartial judges the moſt general and juſt applauſe. To be convinced of this, we need only reflect on the nar-

row and ſelfiſh conduct of ſome, who, either by ſtudy or by chance, have acquired certain valuable ſecrets, which, with the utmoſt induſtry, they conceal, in order to be the more admired, or that they may render them beneficial to themſelves. How contrary the conduct of our ſhepherd! His pains were all his own, but the Fruit of them he thus generouſly offers to the public. Good ſenſe and the dictates of nature taught him this maxim, "That what might benefit *many*, "ſhould not be concealed by *one* from views of *profit* "or of *pride*."

In my remarks upon the ſhepherd's rules, I have ſometimes endeavour'd to ſupport them by authorities, which I muſt confeſs would have been of little uſe if the author had been a perſon of learning; but when it is conſidered, that theſe obſervations were purely the effect of his own attention and experience, it certainly ſtrengthens them, and adds greatly to their credit, that they have been eſteemed evident ſigns of the ſame effects, by the greateſt maſters in this kind of ſcience. The art of prognoſticating the weather may be conſidered as a kind of decyphering; and in that art it is always allowed a point of great conſequence, when ſeveral maſters therein agree as to the meaning of a character: and it is from thence very juſtly preſum'd, that this character is rightly decyphered. I have alſo endeavoured to explain moſt of his obſervations according to the rules of the new philoſophy, which, as it is grounded upon experiments, ſo it, generally ſpeaking, enables us to give a fair and rational account of almoſt all the phænomena taken notice of by the ſhepherd of Banbury. I likewiſe have added ſome other rules in relation to the weather, taken from the common ſayings of our country people, and from old Engliſh books of huſbandry; but I have diſtinguiſhed all theſe from the obſervations themſelves: ſo that the

reader will have no trouble to diſcern the text from the commentary, or to know what belongs to the ſhepherd of Banbury, and what to the editor of his obſervations. This, I think, may ſerve by way of introduction: let us now proceed to the rules themſelves.

THE COUNTRY KALENDAR, OR THE SHEPHERD of *BANBURY*'s OBSERVATIONS.

I.

SUN. *If the Sun riſe red and fiery*---wind and rain.

THE reaſon of this appearance is, becauſe the Sun ſhines thro' a large maſs of vapours, which occaſions that red colour that has been always eſteemed a ſign of rain; eſpecially if the face of the ſun appear bigger than it ought: for then in a few hours the clouds will grow black, and be condens'd into rain; ſudden and ſharp if in the ſummer, but ſettled and moderate if in winter.

The old Engliſh rule, publiſhed in our firſt almanacks, agrees exactly with our author's obſervation:

If red the ſun begins his race,
Be ſure that rain will fall apace.

If the reader would ſee this elegantly deſcrib'd, the maſter of poets hath it thus: *

Above the reſt, the ſun who never lies,
Foretels the change of weather in the ſkies;

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* *Sol* quoque & exoriens, & cum ſe condit in undas,
Signa dabit; *Solem* certiſſima ſigna ſequuntur,
Et quæ mare noſcit, & quæ ſurgentibus *Aſtris*.
Ille ubi naſcentem *maculis* variaverit ortum
Conditus in nubem, medioque refugerit orbe;
Suſpecti tibi ſint *imbres*. Namque urget ab alto
Arboribuſque ſatiſque notus pecoriq ue ſiniſter.

VIRGIL. *Georgic. Lib.* 1. v. 438.

For if he riſe unwilling to his race,
Clouds on his brow, and ſpots upon his face;
Or if thro' miſts he ſhoots his ſullen beams,
Frugal of light, in looſe and ſtraggling ſtreams,
Suſpect a drizzling day and ſouthern rain,
Fatal to fruits, and flocks, and promis'd grain.

II. *If cloudy, and it ſoon decreaſe*---Certain fair weather. I Conceive the reaſon of this to be, that the vapours being then ſpecifically lighter than the air, are ſtill riſing upwards, in which they are aſſiſted by the heat of the ſun-beams; agreeable to the notion of Dr. Derham, who obſerves, that after much cloudy weather it is always fair before it rains, becauſe the watry vapours are not condenſed till they reach the cold upper regions; agreeable to the common Engliſh ſaying,

The evening red and morning grey,
Is a ſign of a fair day.

It is alſo an obſervation of Pliny's, in his natural hiſtory: *

"Si ab ortu ſolis repellentur nubes, & ad occaſum "abibunt, Serenitatem denunciabunt." That is,

If at ſun-riſing the clouds are driven away, and retire as it were to the Weſt, this denotes fair weather.

There is an old adage to this purpoſe, which, becauſe it is ſo very prettily expreſſed, deſerves our notice, *viz.*

A red evening and a grey morning ſets the pilgrim a-walking.

In French thus:

Le rouge ſoir, & blanc matin,
Font rejouvir le pelerin.

The Italians ſay the ſame:

Sera roſa, & nigro matino,
Allegra il peregrino.

* Nat. Hiſt. Lib. XVIII. Cap. 35.

III. CLOUDS. *Small and round, like a dapple-grey, with a* North-wind----Fair weather for 2 or 3 days.

THIS is differently expreſſed by other authors. My lord Bacon tells us, that if clouds appear white, and drive to the *N. W.* it is a ſign of ſeveral days fair weather.

Our old Engliſh almanacks have a maxim to this purpoſe:

If woolly fleeces ſpread the heavenly way,
Be ſure no rain diſturbs the ſummer-day.

And Pliny to the ſame purpoſe *, "Si ſol oriens "cingetur orbe, & poſtea totus defluxerit æqualiter, "Serenitatem dabit:" That is, if the riſing ſun be encompaſſed with an iris or circle of white clouds, and they equally fly away, this is a ſign of fair weather.

There is another Engliſh proverb worth remembering;

In the decay of the moon,
A cloudy morning bodes a fair afternoon.

IV. *Large like rocks*----------Great ſhowers.

IN the old almanacks, we have this ſign of the weather thus expreſſed,

When clouds appear like rocks and towers,
The earth's refreſhed by frequent ſhowers.

The reaſon of this ſeems to be, that the watry vapours are then condenſed, or condenſing, which gives them this rough and ragged appearance: and as ſoon as the thin films that retain the water are broke by this preſſure, theſe heavy clouds deſcend in rain.

Theſe obſervations, as well as ſome that follow, are agreeable to all climates, which is the reaſon that they appear in ſo many different authors, and have been taken notice of in ſo many ages. This however does not at all diminiſh the credit, or the merit of our ſhepherd's obſervations, who certainly drew them not from books, but from his own experience, and therefore their

* Ut ſupra.

agreeing ſo well with the rules of other great maſters ought to eſtabliſh his authority: in ſuch caſes as are not ſupported by a like concurrence from ancient or modern writers, the teſtimony of nature is always ſufficient evidence.

V. *If ſmall clouds increaſe*.....Much rain.

THIS and the following obſervation cannot well be underſtood, without giving ſome account of clouds in general. The atmoſphere is ſuppoſed to extend itſelf about five miles round this globe of earth, and within that ſpace move all kind of vapours, exhal'd by the ſun's force, or protruded by the ſubterraneous heat. The aſcending of theſe vapours into the air depends upon many things; and is therefore as different as its cauſes: for inſtance, their aſcent depends, in the *firſt* place, on the degree of heat with which they are drawn up or forc'd out; *next*, upon the lightneſs of the vapours themſelves; 3*dly*, on the denſity or rarity of the air thro' which they paſs; and *laſtly*, on the force and direction of the winds which they encounter in their paſſage.

According to the nature of theſe vapours, and the circumſtance attending their paſſage, they appear to us differently below. For, if they be extremely ſubtile, they mount very high, and there, according to the ſentiments of Sir Iſaac Newton, form by refraction the azure or blue colour that overſpreads the ſky in ſerene weather. Clouds, while they remain viſible, do not riſe above the height of a mile; and we always obſerve, that the higheſt are of a very light colour, and hardly ſeen. If, therefore, ſmall clouds increaſe, it ſhews, that the diſpoſition of the air is ſuch, as that theſe clouds cannot riſe therein, either from their own weight, the want of a protruſive force, or from the falling of the wind, which, in cloudy weather, is always a ſign of rain.

VI. *If large clouds decreaſe*------Fair weather.

THE ſame kind of reaſoning accounts very clearly for this prognoſtick, ſince it ſhews, that the vapours are either exhal'd by the ſun's heat, or are driven off by winds, and ſo reſolv'd into ſmaller clouds, capable of aſcending higher in the atmoſphere; all which are circumſtances that ſecure us from rain, and afford us a certainty of fair weather.

It is, however, to be obſerved, that large black clouds are frequently, in a ſummer-evening, melted into dews; and this much more frequently happens in the autumn, becauſe the evenings are then cooler, and the vapours more eaſily condenſed for that reaſon. In all obſervations of this ſort, there is a great degree of prudence and good ſenſe required to apply them; and hence it very frequently happens, that ſuch obſervations are condemn'd as treacherous and abuſive, merely becauſe thoſe who would employ them want the ſagacity which is requiſite to underſtand them clearly.

VII. MISTS. *If they riſe in low ground and ſoon vaniſh*------Fair weather.

THIS is a ſure ſign, and very well expreſſed, that is, clearly and in few words, which is the excellency of ſuch aphoriſms. In order to be convinced of its good ſenſe and certainty, we muſt conſider a little what Miſts are, whence they riſe, and what becomes of them.

Miſts are, ſtrictly ſpeaking, uncompacted exhalations, which, while they fleet near the earth, are ſtiled Miſts; but when they aſcend into the air, are called Clouds. If therefore, riſing out of low ground, they are driven along the plain, and are ſoon loſt to the ſight, it muſt ariſe from ſome of theſe cauſes; That there is an air abroad ſufficient to divide and reſolve them, or the heat of the ſun has been ſtrong enough

to exhale them, that is, to rarify them ſo as to render them lighter than the air thro' which they were to paſs. Which ever way this happens, the maxim remains unimpeach'd.

VIII. *If they riſe to the Hill-tops*----Rain in a day or two.

WHEN miſts are very heavy in themſelves, and riſe only by the action of that protruſive force exerted by the ſubterranean fire, they can riſe no higher than where the gravitation becomes ſuperior to that protruſive force; for then they deſcend again by their own weight: and this occaſions the appearance, mentioned in the obſervation, of their hanging upon hill-tops, where they are very ſoon condenſed, and fall down in rain.

There was formerly a very idle and ill-grounded diſtinction between moiſt and dry exhalations; whereas in truth all exhalations are moiſt, or, in other words, are watry ſteams thrown off by bodies reſpectively dry; and the former diſtinction was invented only to ſolve theſe phænomena of which we have been ſpeaking, that is, the miſt riſing and diſperſing without rain, and the miſt condenſed and reſolved into rain, which, as I have ſhewn may be much better explained without any ſuch diſtinction.

IX. *A general miſt before the ſun riſes, near the full moon*-----Fair weather.

THIS is a general and a very extenſive obſervation, which enables us to judge of the weather for about a fortnight; and there is very great reaſon to believe that it will very rarely deceive us. In order to convince the reader of this, it will be neceſſary to explain as far as we are able the cauſes of this.

Miſts are obſerved to happen when the mercury in a barometer is either very low or very high: they happen, when it is high, after the region of the air has

continued calm a good while, and in the mean time a great abundance of vapours and exhalations have been accumulated, making the air dark by their quantity, and the diſorderly diſpoſition of their parts. They happen, when the mercury is low, ſometimes becauſe the rarity of the air renders it unable to ſuſtain the vapours, which therefore deſcend and fall through it.

But none of theſe caſes agree with the obſervation we are now conſidering; and therefore, to form a true judgment of the weather, we muſt diſtinguiſh between them and the caſe which explains the obſervation.

X. *If in the new moon*----Rain in the old.

WHEN exhalations riſe copiouſly from the earth into the region of the air, and the air itſelf is in a proper diſpoſition, they aſcend to a great height, and continue a long time before they are condenſed; which accounts very clearly and philoſophically for the interval of fair weather between the riſing of theſe miſts and their falling down again in ſhowers. Their aſcending about ſun-riſe is a proof that the air is thin, but at the ſame time of a force ſufficient to ſuſtain them; ſince, if the miſts were not ſpecifically lighter than the air itſelf, they could not aſcend.

When the moon is at the full, and ſuch exhalations riſe plentifully, the time neceſſary for them to float in the atmoſphere, before they are condenſed into clouds and rain, extends, generally ſpeaking, beyond the period of that moon; and therefore the obſervation directs us to expect Fair Weather.

XI. *If in the old*------Rain in the new.

BUT as it is obſerved not only in this climate, but all the world over, that great changes of weather happen near the change of the moon, it follows, that this is the ſeaſon when theſe exhalations that aſcend ſo

plentifully at ſun-riſing are condenſed, and conſequently is the ſeaſon when we ought to expect Rain.

If therefore the exhalations riſe in the new moon, it is a ſign that the air is in a fit diſpoſition to ſuſtain and ſupport them for a conſiderable time, and therefore we have reaſon to expect that they ſhould continue floating till the next regular change of weather, that is, till the old of the moon, or rather till towards the change: and therefore the obſervation is very cautiouſly and very properly worded, directing us to expect rain *in* the old, and *in* the new, and not *at* the old or new; becauſe it is obſerved that theſe changes of weather happen not exactly at the change of the moon, but a day or two before or after, of which the reader will meet with many examples in captain Dampier's hiſtory of winds and ſtorms at ſea.

XII. WINDS. *Obſerve, that in eight years time there is as much South-weſt wind, as North-eaſt; and conſequently as many wet years as dry.*

THIS muſt be allowed a very extraordinary aphoriſm from a country ſhepherd; but at the ſame time it is very agreeable to the obſervations of Dr. Hooke, Dr. Derham, Dr. Grew, and other able naturaliſts, who, with unwearied pains and diligence, have calculated the quantity of rain falling in one year, and compared it with what fell in another. Lord Bacon, that honour to our nation and the age which produced him, informs us, that it was an old opinion, there was a total revolution of the weather once in forty years, and wiſhes it was inquired into. I cannot tell whether this has ever been done or not, but I think there is good reaſon to conclude, that there is a natural balance eſtabliſhed of wet and dry weather, as of light and darkneſs, heat and cold, and other ſuch-like variations.

It may not be amiſs to caution the reader againſt a miſtake into which the manner of this rule being ſtated may eaſily lead him; it is this, that South-weſt winds cauſe rain, and North-eaſt winds fair weather, which however is not a thing clear or certain by any means. This indeed is true, that South-weſt winds and rain, North-eaſt winds and fair weather come together, generally ſpeaking: But the queſtion is, which cauſes the other; and a more difficult queſtion cannot eaſily be ſtated, becauſe there ſeems to be facts on both ſides. South-weſt winds ſeldom continue long without rain; this ſeems to prove the affirmative: but, on the other hand, when in hard weather rain begins to fall, the wind commonly veers to the South-weſt; this looks as if the rain cauſed the wind.

But to keep cloſe to the ſhepherd's obſervation. There is one thing ſeems ſtrongly to confirm it, which is this, that in any given place the quantity of rain, one year with another, is found to be the ſame by experience, according to which the following table has been calculated, for the mean quantity of rain falling one Year with another in thoſe places that are mentioned, and on this proportion the other ſeems to be founded.

At Harlem	24	Inches
Delft	27	
Dort	40	
Middleburg	33	
Paris	20	
Lyons	37	
Rome	20	
Padua	37½	
Piſa	34½	
Ulm	27	
Berlin	19½	
In Lancaſhire	40	
Eſſex	19½	

XII. *When the wind turns to North-eaſt, and it continues two days without rain, and does not turn South on the third day, nor rain the third day, it is likely to continue North-eaſt for eight or nine days,* all fair; *and then to come to the South again.*

IN my opinion this and the ſubſequent remarks depend entirely upon obſervations, and may ſerve rather to found an hypotheſis, than ſeem to be deduced from one. That the variations of the wind depend on certain cauſes, and may conſequently be reduced to rules, is highly probable; and ſuch obſervations as theſe render it in a manner certain. But to explore theſe cauſes, and to explain them in ſuch a manner as to account for theſe phænomena in a ſatisfactory manner, requires not only great ſagacity, but much experience, and many years obſervation; which however, conſidering the great benefits that would reſult to mankind from eſtabliſhing ſuch a THEORY, would be time well beſtowed.

We may however eaſily conceive, that a conſtant North-eaſt wind muſt be accompanied with fair weather: for whatever the cauſes of winds may be, yet, on this ſide the equator, a ſtrong and ſettled North-eaſt always buoys up the clouds, and keeps them ſuſpended. This has been long obſerved by, and paſſes for a ſettled point amongſt ſeamen. The reaſon of it however cannot be ſo eaſily aſſigned, at leaſt a ſatisfactory reaſon; for as to ſuppoſitions, every fanciful man can furniſh them at pleaſure.

This, as well as the following obſervations, very plainly and clearly prove, that, in this part of the world, fair weather attends one wind, and wet another: but which is the cauſe, and which is the effect, or whether both are not the effects of ſome other cauſe, I pretend not abſolutely to determine. But inaſmuch as it is certainly known, that rains attend, in other climates, thoſe winds that are here attended with

fair weather, it ſeems more agreeable to ſuppoſe, that rainy weather is occaſioned chiefly by Weſt-winds, becauſe loaded with moiſt vapours from the ſea.

XIV. *If it turn again out of the South to the North-eaſt with rain, and continues in the North-eaſt two days without rain, and neither turns South nor rains the third day*, it is like to continue North-eaſt for two or three months.

The wind will finiſh theſe turns in three weeks.

THIS obſervation is of the ſame nature with the former, and is plainly deduced from long experience. Our author ſeems to contradict himſelf in ſaying, that theſe winds finiſh their turns in three weeks; but his true meaning certainly is, that they are about three weeks in turning from the South to the North-eaſt again. Some very great men have laid it down as a thing certain, that the variations of the wind are to be accounted for by the alteration of the balance of the air, occaſioned by the different effects of heat and cold; but other writers again inſiſt very copiouſly on the effects which winds have upon the air, and thus confound us in a circle of cauſes and effects; whence it is plain, that they do not thoroughly underſtand the ſubject themſelves, and therefore it is no wonder that they are not able to explain it to others.

In ſome parts of the world, and eſpecially between the tropicks, the winds are regular; and therefore our philoſophers ſeem to talk more rationally about them. But, in our Northern countries, the alterations of the wind are ſo frequent, ſudden, and often ſo little agreeable to the ſeaſon, that ſuch general reaſonings will by no means ſerve to explain them. It is however very reaſonable to ſuppoſe, that the ſame general cauſe prevails here as between the tropicks, but with leſs cer-

tainty; becauſe the power of the ſun is not ſo great, and the determination of the winds depends on the ſituation of mountains, rocks and woods, which direct the air driving againſt them into certain courſes; ſo that it is impoſſible to explain, or indeed to judge of the courſe of the winds, till the country is thoroughly known, and all thoſe eminences that can affect the winds are well conſidered.

From theſe reflexions the value of our ſhepherd's obſervations will clearly appear. He was not philoſopher enough to talk in this ſtile, but, by a long and ſteady attention, he came to know experimentally, what perhaps few philoſophers, with all their ſagacity, would have been able to have found out.

XV. S. W. WINDS. *After a northerly wind for the moſt part two months or more, and then coming South, there are uſually* three or four fair days at firſt, and then on the fourth or fifth day comes rain, *or elſe the wind turns North again,* and continues dry.

THIS is likeways a very judicious and a very uſeful obſervation, and yet it is not a difficult matter to account for it. It is a common obſervation, and a very true one, that there is uſually fair weather before a ſettled courſe of rain. The winds that bring the dark rainy clouds that obſcure the ſky, and cauſe dull cloudy weather, often raiſe theſe vapours to ſuch a height, that they are attracted into the cold region above our ſight, till being condenſed there, they fall down upon us again in ſnow or rain, according to our author's obſervation.

But if, after a ſeeming tendency to rain, there follows ſeveral days of fine weather, it is a certain indication that the temper of the air is altered, and that theſe vapours had been driven off before they had time to condenſe, which is confirmed by the change of the wind on ſuch occaſions

All theſe obſervations are to be underſtood in a proper latitude, and not ſtrictly and according to the very letter: For rain may fall the ſixth or ſeventh day, or the wind may change the ſecond or third. Beſides, a man who would make uſe of theſe obſervations in the country, muſt conſider attentively the ſituation of the place where he lives, the bearing of the ſea, marſhes, ponds, lakes, woods, mountains, rocks, &c. For without making proper allowances for theſe, all ſuch obſervations on the weather will be apt to fail him.

XVI. *If it returns to the South within a day or two without rain, and Northward with rain, and return to the South in one or two days, as before, two or three times together after this ſort,* then it is like to be in the South or South-weſt two or three months together, *as it was in the North before.*

The winds will finiſh theſe turns in a fortnight.

THIS may appear a little perplexed to an ordinary reader, but a little attention will make it very clear and plain; and whoever conſiders what mighty uſes may be made of the foreſight of weather for a month or two, will not think this labour ill beſtowed. I muſt confeſs I look upon theſe three rules, in relation to the wind, as the moſt uſeful in the whole collection; eſpecially to farmers and country people, to whom they are of the greateſt conſequence.

But it is a common thing for ſuch people to ſay, What certainty is there that theſe rules will prove true? What probability is there that the wind ſhould continue ſo long in one quarter, and then ſo long in another? How ſhall we be ſatisfied that there is any truth in this? Or, if we cannot be ſatisfied as to the truth of it, why ſhould we depend upon any ſuch-like obſervations?

To this I anſwer, That they may have reaſonable ſatisfaction given them on this head. Some of our great naturaliſts, who had kept journals of the weather for many years, have found that the ſame wind blows every year very near the ſame number of days, and that there is a regular continuance of different winds annually in every country. For inſtance,

At Utrecht they blow thus,

The North wind	-	42 Days
The N. W.	- -	33
The Weſt	- - -	77
The S. W.	- -	58
The South	- - -	33
The S. E.	- -	26
The Eaſt	- - -	53
The N. E.	- -	43
		365

It is a thing plain to every capacity, that a journal or diary of the winds may be kept any where; and if, from ſuch a journal, it appears, that a given wind blows for a certain number of days, then it follows that if theſe can be determined with certainty, the time of their blowing may alſo be determined, at leaſt with great probability; which is as ſatisfactory an anſwer as can be juſtly expected: becauſe it ſhews that there is a juſt and rational ground for confiding in ſuch obſervations, when confirmed by long experience.

XVII. *Fair weather for a week with a ſouthern wind is like to* produce *a* great Drought, *if there has been much rain out of the South before. The wind uſually turns from North to South, with a quiet wind without rain, but returns to the North with a ſtrong wind and rain: the ſtrongeſt winds are when it turns from South, to North by Weſt.*

N. B. *When the North wind firſt clears the air, (which is uſually once a week) be ſure of* a fair *day or two.*

OBSERVATIONS of this nature upon winds have employed the ableſt heads in all ages. Pliny, the great naturaliſt, has left us a great deal upon this ſubject, which plainly proves, that it has been the opinion of the ableſt and wiſeſt men, that ſtudy, and experience might reduce even things of ſuch ſeeming uncertainty under ſtated rules, and within the bounds of a regular ſyſtem: For inſtance he tells us,

" In Africa the ſouth wind is ſerene, the north-eaſt " cloudy. All the winds have their turns. To judge " rationally of their changes, the fourth day of the " moon is to be regarded.----The ſouth wind blows " ſtronger than the north-eaſt, becauſe the former riſes " from the bottom, whereas the latter comes from the " ſurface of the ſea. It is for this reaſon that thoſe " earthquakes are moſt dangerous that follow after a " ſouth wind.

In order to underſtand this notion of Pliny, we need only advert to the account given us by the reverend Mr. Robinſon in his natural hiſtory of Weſtmoreland, which is exceedingly curious, and well worthy of the reader's peruſal. This ingenious gentleman is of opinion, that winds have their original from the ſea; of which he gives the following very probable account.

" It," that is, the wind, "proceeds from vaſt ſwarms " of nitrous particles ariſing from the bottom of the " ſea, which is put into motion either by the cen-

" tral fire, or by the heat and fermentation which a-
" bounds in this great body of the earth; and there-
" fore the firſt commotion excited by the ſaid fermen-
" tation we call a Bottom-wind, which is preſently
" diſcovered by porpoiſes and other ſea-fiſh, which de-
" light in ſporting and playing upon the waves of the
" ſea, and by their playing give the mariners the firſt
" notice of an approaching ſtorm."

" When theſe nitrous ſwarms are riſen towards the
" ſurface of the ſea in a dark night, they cauſe ſuch
" a ſhining light upon the waves as if the ſea was on
" fire. And being delivered from the brackiſh water,
" and received into the open air, thoſe fiery and ſhin-
" ing meteors which fix upon the maſts and ſides of
" the ſhips, are only nitrous particles condenſed by
" the circumambient cold, and, like that which the
" chymiſts call Phoſphorus, or artificial glow-worm,
" ſhine and caſt a light, but have no heat: This gives
" the mariners the ſecond notice that the ſtorm is ri-
" ſing; for, upon the firſt breaking out of the wind,
" the ſea begins to be rough, and the waves ſwell and
" riſe, when at the ſame time the air is calm and
" clear."

" This boiling fermentation of the ſea cauſes the
" vapours to riſe, which by the intenſeneſs of the cir-
" cumambient cold are condenſed into thick clouds,
" and fall down in ſtorms of wind and rain, firſt upon
" the ſea from whence they aroſe; and then the at-
" tractive power of the mountain-cold, by a ſecret
" magnetiſm between vapour and cold, attracts the
" wateriſh vapours, intermixt with nitrous particles, to
" the high tops of mountains and hills, where they
" hang hovering in thick fogs, and wateriſh miſts, un-
" til the atmoſpherical heat rariſies the nitrous part of
" the fog, (which is always uppermoſt, and appears
" white and tranſlucent) into briſk gales of wind, and
" the intenſeneſs of atmoſpherical cold having attrac-

" ted the vapours into the colder regions of the air,
" where being condenſed into clouds, the wind breaks,
" diſſipates and drives them before it, till they fall
" down in rain, and water the ſurface of the earth.
" And this ſeems to be the reaſon why in Egypt, and
" thoſe level countries where they have no mountains,
" they have little wind, and leſs rain.

XVIII. CLOUDS. *In ſummer or harveſt, when the wind has been South two or three days, and it grows very hot, and you ſee clouds riſe with great white tops like towers, as if one were upon the top of another, and join'd together with black on the nether ſide,* there will be thunder and rain ſuddenly.

WE may very eaſily account for this obſervation; becauſe, in fact, theſigns here mentioned are no other than nature's apparatus for a ſtorm of thunder and lightening, which will be perfectly underſtood, by attending a little to the cauſes of theſe meteors. Lightening is a great flame, very bright, extending every way to a great diſtance, ſuddenly darting upwards, there ending, ſo that it is only momentaneous. The matter which produces the fire, is the oil of plants attenuated by the heat of the day, and raiſed on high. Then whatever has exhaled from the earth that is ſulphureous or oily, which is diſperſed up and down the atmoſphere, and is not continuous, is ſet on fire by turns, and the flame dilates itſelf as far as the tract of that exhalation reaches. Some other ſubſtance, pendent and floating in the air, meets with this alſo, with which it excites an efferveſcence, takes fire and flaſhes along with it. Thunder is another bright flame, riſing on a ſudden, moving with great violence, and with a very rapid velocity through the air, according to any determination, upwards from the earth horizontally, obliquely, downwards in a right line, or in ſeveral right lines,

as it were in ſerpentine tracts joined at various angles, and commonly ending with a loud noiſe or rattling.

It is obſerved that it thunders moſt when the wind blows from the South, and leaſt when it blows from the Eaſt. The great principle of thunder is ſulphur, as is evident from the ſmell it leaves behind it; but, in order to occaſion ſuch an exploſion, there muſt be other ingredients mixed therewith, eſpecially nitre, of which the air is always full; beſides other things of which it is impoſſible to give any account. The tracts of this ſort of matter fly about in the air, and are as it were lines of gun-powder; and as, in the firing of that powder, the fire begins at one end, and purſuing its aliment proceeds to the other extremity, and ſo the whole maſs of powder is fired, we may from thence account for the phænomenon of thunder. For, in like manner, thoſe inflamed tracts which are ſuſpended in the air, flaſh from a flame that runs from one extreme to the other, wherever the vein of nouriſhment leads it: Hence thoſe rays of thunder, which ſeem to be brandiſhed through the air, and ſometimes to be ſplit in two or more tracts, and ſometimes to return back at other times; to be projected in lines that are joined by various angles; and this only becauſe the flame meets with tracts lying in various ſituations that cohere one with another. Therefore thunder ſeems now to run horizontally, now from above downwards, now upwards from the earth; for, if the matter of thunder preſſing out of the earth is enflamed near the ground, the flame darting upwards, the thunder will ſeem to be projected out of the earth. If the ſame tract be ſet on fire at its upper end, the flame will move downwards, and the thunder will ſeem to deſcend out of the ſky.

Hence we eaſily underſtand, how it comes to thunder oftner in one place than another; but moſt frequently in thoſe where the ſoil produces odoriferous

herbs and abounds with ſulphur, and where the people are much expoſed to the extreme heat of the ſun. Thunder is leſs frequent in places where there are few odoriferous herbs, very little ſulphur, or where the climate is watry and moiſt. For inſtance, it thunders very much in Italy and Sicily, and very rarely in Egypt and the adjacent countries. If it be demanded, how it comes to thunder in the midſt of the ocean? The anſwer is eaſy, Becauſe, from the bottom of the ocean, vaſt tracts of ſulphureous matter are caſt up through the waters; as it happens to ſpring-waters in ſeveral places, the ſtreams of which will take fire from a lighted candle. For ſulphureous exhalations burſting out together with the waters, the fulmineous matter in the air is ſet on fire when it meets with exhalations or vapours, with which it can exhibite a vehement effervescence. It is very clear from this account, that the clouds mentioned towards the head of the 17th page, are thunder-clouds, or clouds big with the materials of thunder.

XIX. *If two ſuch clouds ariſe, one on either hand,* it is time to make haſte to ſhelter.

AS this obſervation is of the ſame nature with the former, we ſhall continue our remarks. The reaſon why it ſeldom thunders in winter is, becauſe the exterior parts of the earth are ſo contracted by the cold, ſnow, and ice, that ſulphur cannot perſpire in any great quantities; but as ſoon as the earth begins to be opened by the ſun in the ſpring, ſomething tranſpires in the month of April which takes fire. But, by the greater heat of the ſun penetrating deeper into the earth, the cortex is more opened in May; and now there is a more copious perſpiration of the fulminating matter, and whatever was collected and ſhut up in winter, is now releaſed and ſnatched up in the air: and thence pro-

ceeds the moſt frequent thunders in the month of May, and chiefly, when a very hot day or two has gone before. A leſs quantity of the ſame matter remains in the upper cortex of the earth for the month of June; but, in the mean time, a ſtock ariſes out of the deeper bowels of the earth, which is attenuated and prepared, ſo that, by the very fervent heat of July, it is elevated, as it were in heaps, and ſet on fire. Hence thunder is as freqnent in July as in May. And the heat decreaſing in the ſucceeding months, the exhalation of the fulminating matter out of the earth is more ſparing; and thence alſo the thunder is leſs frequent, till, in October and the other winter months, the earth is bound up with us, and hardly perſpires any more. Hence we ſee, why it very ſeldom thunders when the northerly winds blow; for theſe winds conſtringe the earth with their cold, and ſo hinder the fulminating matter from burſting forth; and when they are burſt forth and floating in the air, they hinder their effervescency. But, on the contrary, when the warm and moiſt South wind blows, which opens every thing, the earth likeways is opened, and abundance of fulminating matter perſpires and aſcends on high, which is there eaſily enflamed.

As the flame runs very ſwiftly, it ſeems to carry along with it particles which it could not ſo eaſily ſet on fire; and when any of theſe particles are drawn together, and heated to a certain degree, they at laſt take fire with a ſudden and great exploſion, and thereby produce what we call a thunder-clap. Now tho' this be only a ſingle ſound, yet it is often heard in the form of a great murmuring noiſe of a long continuance; ſometimes for thirty or forty ſeconds, becauſe of its various repercuſſions by the clouds and terreſtrial obſtacles. Hence it is, that in vales which are ſurrounded by mountains of a different height, there is a terrible and long continued bellowing of thunder-claps;

whereas, for one exploſion, it has been obſerved, that there is but one clap: Yet however, if the flame ſet fire to two, three, or more fulmineous tracts, each of them at laſt will end in a clap, and thus ſeveral ſounds may be heard together, or quickly ſucceeding one another.

XX. *If you ſee a cloud riſe againſt the wind, or ſide wind, when that cloud comes up to you, the wind will blow the ſame way that the cloud came. And the ſame rule holds of a clear place, when all the ſky is equally thick, except one clear edge.*

THIS ſeems to ariſe from hence, that wind being nothing more than air in motion, the effects of it firſt diſcover themſelves above, and actually drive ſuch clouds before them. This was long ago obſerved by Pliny: When clouds, ſays he, float about in a ſerene ſky, from whatever quarter they come you may expect winds. If they are collected together in one place, they will be diſperſed by the approach of the ſun. If theſe clouds come from the North-eaſt they denote winds; if from the South great rains. But let them come from what quarter they will, if you ſee them driving thus about ſun-ſet, they are ſure ſigns of an approaching tempeſt.

If the clouds look duſky, or of a tarniſh'd ſilver colour, and move very ſlowly, it is a ſign of hail. But, to ſpeak more plainly, thoſe very clouds are laden with hail, which, if there be a mixture of blue in the clouds, will be ſmall; but if very yellow, large. Small ſcattering clouds that fly very high, eſpecially from the South-weſt, denote whirl-winds. The ſhooting of fallen ſtars through them is a ſign of thunder. We meet with many obſervations of this ſort in our old writers on huſbandry; and we have abundance of proverbs relating to this ſubject, which are worth obſerv-

ing; and the rather becauſe the moſt of them are not peculiar to our language only, but common to us with many of our neighbours. It is the remark of lord Bacon, and a very judicious remark too, that proverbs are the philoſophy of the common people, that is to ſay, they are trite remarks founded in truth, and fitted for memory. I muſt confeſs that there are ſome of them that ſeem either falſe, or of no great conſequence; but then I am apt to ſuſpect, that, by various accidents, we have loſt their true meaning, or elſe that, in length of time, they have been altered and corrupted, till they have little or no meaning at all.

I cannot help taking notice, in regard to the rule before us, of what captain Dampier tells us, that in the Eaſt Indies they have always notice of a tuffoon, by the ſkies being firſt clear and calm, and then a ſmall white cloud hanging preciſely in the point from whence the ſtorm comes, where he obſerves, that it remains ſometimes twelve hours or more; and adds, that as ſoon as it begins to move, the wind preſently follows it. When Sir John Bury, who died an Engliſh admiral, had the command of a ſmall frigate in the Weſt Indies, he eſcaped a hurricane in the Leeward iſlands, by taking the advice of a poor negro, who ſhewed him a ſmall white cloud at a diſtance, and aſſured him, that, when it came to the Zenith, the hurricane would infallibly begin, as indeed it did.

XXI. *Sudden rains never* laſt long: *But when the air grows thick by degrees, and the ſun, moon and ſtars ſhine dimmer and dimmer, then it is like* to rain ſix hours uſually.

RAIN is, properly ſpeaking, a multitude of ſmall watry drops, falling from the upper air at different ſeaſons. When the upper regions become cold of a ſudden, the watry clouds are condenſed and fall in haſty ſhowers. It is obſerved, that mountainous coun-

tries have moſt rain; and the reaſon ſeems to be the winds driving the clouds againſt the rocks and hills, and thereby compreſſing them in ſuch a manner, that they are immediately diſſolved, and fall as it were at once. This is the reaſon that in Lancaſhire there falls twice as much rain as in Eſſex; and it is probably from the ſame cauſe that, in the ocean, over againſt the mountainous coaſt of Guinea, ſhowers ſometimes fall as it were by pail-fulls.

This obſervation of our ſhepherd is very juſt and reaſonable, and I dare ſay will hardly ever fail ſuch as obſerve it. The dimneſs of the ſtars and other heavenly bodies, is one of the ſureſt ſigns of very rainy weather. It is likewiſe to be obſerved, that when the ſtars look bigger than uſual, and are pale and dull and without rays, this undoubtedly indicates, that the clouds are condenſing into rain which will very ſoon fall; and it has been obſerved, that when the air grows thick by degrees, and the light of the ſun leſſens ſo as not to be diſcerned at all, and again when the moon or ſtars have the ſame appearances, a continued rain for at leaſt ſix hours is ſure to follow.

To be the better informed in ſuch caſes, it is beſt to have recourſe to a variety of ſigns; for it is not only the clouds and ſky, or the ſun, moon and ſtars, that give us previous notice of rainy weather, but almoſt every thing in the creation, and vegetables particularly: As for inſtance, the Pimpernel, which is a very common flower, ſhuts itſelf up extremely cloſe againſt rainy weather. In like manner the Trefoil ſwells in the ſtalk againſt rain, ſo that it ſtands up very ſtiff, but the leaves droop and hang down. Even the moſt ſolid bodies are affected by this change of the atmoſphere; for ſtones ſeem to ſweat, and wood ſwells, the air driving the moiſt particles, with which it is filled, into the pores of dry wood eſpecially, making it ſwell

prodigiouſly; and this is the reaſon the doors and windows are hard to ſhut in rainy weather.

This is ſo true, that there has been a method found of dividing mill-ſtones by the mere force of the air, which is done in this manner. They divide a block of this kind of ſtone, as big as a large rolling-ſtone, into as many parts as they deſign to make mill-ſtones, and, in the circles where this block is to be divided, they pierce ſeveral holes, which they fill with Sallow-wood dried in an oven, and expoſe the ſtone to the air in moiſt weather, when the wood ſwells to ſuch a degree as to ſplit the ſtone, as effectually as if it was done by iron wedges driven by Sledge-hammers. This curious and extraordinary method of dividing mill-ſtones is related by the famous Mr. Ozanam, of his own knowledge.

XXII. *If it begin to rain from the South, with a high wind for two or three hours, and the wind falls, but the rain continues,* it is like to rain twelve hours or more; and does uſually rain till a ſtrong North-wind clears the air. *Theſe long rains ſeldom hold above twelve hours, or happen above* once a year.

THIS depends entirely upon obſervation; and experience ſhews us, that whenever the wind falls, rain follows. It has been likewiſe obſerved, that when the wind changes often, there fall heavy rains. All theſe alterations in the atmoſphere are leſs obſerved by men, than by animals, for two reaſons: The firſt is, that we live much within doors, by which they are leſs obvious to us; and it is for this reaſon that the huſbandmen, ſeamen, fiſhermen, but above all ſhepherds, who are more in the open air than other men, are better acquainted with, and more able to diſtinguiſh and judge of the ſigns of the alterations of the weather, than thoſe who live altogether within doors, or go out but ſeldom. Another reaſon is, our having ſo many

things to mind, which takes off our thoughts, and renders us leſs attentive to the ſignals which would give us notice of ſuch alterations. It is for this reaſon that we ought to ſerve ourſelves of that ſort of inſtinct which nature has given to other animals, and which, as it is a gift of nature, is in a manner infallible.

Thus, if ſmall birds prune themſelves, and duck, and make a ſhew of waſhing; if crows make a great noiſe in the evening; if geeſe gaggle more than uſual, theſe are all ſigns of rain; becauſe theſe animals love wet weather, and rejoice at the approach of it. On the other hand, if oxen lye on their right ſides, look towards the ſouth, and lick their hoofs; if cows look up in the air, and ſnuff it; if aſſes bray violently; and if cocks crow at unuſual hours, but eſpecially when a hen and chickens croud into the houſe, theſe are ſure ſigns of rain.

Inſects alſo are very ſenſible of ſuch changes of weather: Frogs croak more than ordinary, worms creep out of the ground, moles throw up more earth than uſual, becauſe ſuch weather is more agreeable to them. Hornets, waſps and gnats, ſting more frequently againſt wet weather than in fair. Spiders are reſtleſs and uneaſy, and frequently drop from the wall, the humid air getting into their webs and making them heavy. But the ſureſt and moſt certain ſign is taken from bees, which are more incommoded by rain than almoſt any other creatures; and therefore, as ſoon as the air begins to grow heavy, and the vapours to condenſe, they will not fly from their hives, but either remain in them all day, or elſe fly but to a ſmall diſtance.

XXIII. *If it begins to rain an hour or two before ſun-riſing it is like to be* fair before noon, and ſo continue that day; *but if the rain begin an hour or two after ſun-riſing, it is like* to rain all that day, *except the rain-bow be ſeen before it rains.*

THIS is a ſhort, clear and eaſy obſervation, and therefore I ſhall not dwell long upon it, but rather entertain the reader with a few obſervations on the rainbow. Whenever it appears, things are thus circumſtanced: The Spectator has the ſun behind him, and clouds with the bow in them before him. Sometimes there are two and even three bows ſeen, but this is very rare. The colours in the bow are ranged in this order, *viz.* violet, purple, blue, green, yellow, orange, red. After a long drought, the bow is a certain ſign of rain; after much wet, of fair weather. If the green be large and bright, it is a ſign of rain; but if the red be the ſtrongeſt colour, then it denotes wind and rain together. If the bow breaks up all at once, there will follow ſerene and ſettled weather. If the bow be ſeen in the morning, ſmall rain will follow; if at noon, ſettled and heavy rains; if at night, fair weather. The appearance of two or three rainbows ſhews fair weather for the preſent, but ſettled and heavy rains in two or three days time.

Lunar rain-bows are ſometimes, but very ſeldom ſeen; they are extremely beautiful, but much leſs than thoſe that appear in the day-time, and a yellow or rather a ſtraw-colour prevails moſt. As they happen ſo ſeldom, they cannot well be reckoned amongſt the ſigns of weather. But now, after ſpeaking of ſo many different methods of judging when rainy weather will be of a ſhort or long continuance, give me leave to deſcribe two or three inſtruments, eaſily made, which will ſhew the alterations of the weather certainly, conſtantly, and early enough for moſt uſes.

There were, ſome years ago, a ſort of toys ſold, with a man and a woman ſo fixt before the door of a houſe, that at the approach of wet-weather the woman entered it, and when the weather grew fair the man: This was done by the help of a bit of cat-gut, which ſhrinks in wet weather, and ſtretches again when it is fair. This appears better by a line and plummet; eſpecially if the line be made of good whip-cord, that is well dried; for then if it be hung againſt a wainſcot, and a line drawn under it exactly where the plummet reaches, in very moderate weather, it will be found to riſe above it before rain, and to ſink below when the weather is like to become fair. But the beſt inſtrument of all is a good pair of ſcales, in one of which let there be a braſs weight of a pound, and in the other a pound of ſalt, or of ſaltpetre well dried, a ſtand being placed under the ſcale, ſo as to hinder its falling too low; when it is inclined to rain, the ſalt will ſwell and ſink the ſcale; when the weather is growing fair, the braſs weight will regain its aſcendancy.

XXIV. SPRING and SUMMER. *If the laſt eighteen days of* February, *and ten days of* March, *be for the moſt part* rainy, *then the* ſpring *and* ſummer *quarters are like to be ſo too: And I never knew* a great drought, *but it entered* in that ſeaſon.

IT is eaſy to diſcover by obſervation whether this rule be well or ill founded, that is to ſay, whether our ſhepherd's obſervation will ſerve for other places or not, and where it will ſerve and where not. But it may not be amiſs to remark, that it is highly probable, or rather abſolutely certain, that the weather in one ſeaſon of the year determines the weather in another: For inſtance, if there be a rainy winter, then the autumn will be dry; if a dry ſpring, then a rainy winter. Our fore-fathers had abundance of odd ſayings upon this ſubject, and ſome proverbs for every month in the

year; but I doubt they were indifferently founded: however, there can be no harm in obſerving them, in in order to diſcover whether there be any thing in them or not.

Janiver freeze the pot by the fire.
If the graſs grow in Janiveer,
It grows the worſe for't all the year.
The Welchman had rather ſee his dam on the Beir,
Than to ſee a fair Februeer.
March wind and May ſun
Makes clothes white and maids dun.
When April blows his horn,
'Tis good both for hay and corn.
An April flood
Carries away the frog and her brood.
A cold May and a windy
Makes a full barn and a fendy.
A May flood never did good.
A ſwarm of bees in May
Is worth a load of hay:
But a ſwarm in July
Is not worth a fly, &c.

XXV. WINTER. *If the latter end of* October *and beginning of* November *be for the moſt part warm and rainy, then* January *and* February are like to be froſty and cold, *except after a very dry ſummer.*

IT is very evident, ſuppoſing this obſervation to be true, as I am pretty confident it is, that the reaſon of it is to be ſought in that balance of the weather which providence has eſtabliſhed. There is not only a time to ſow, and a time to reap, but there is a time alſo for dry, and a time for wet weather; and if theſe do not happen at proper ſeaſons, they will certainly happen at other ſeaſons: for not only the wiſdom of philoſophers hath diſcerned, but their experiments and obſer-

vations hath put it out of doubt, that there is a certain rule or proportion obſerved between wet weather and dry in every country; ſo that it is nearly the ſame in every annual revolution: neither is it wet and dry weather only, but hot and cold, open and froſt, that are thus regulated; from whence we ſee, that when the ſcripture repreſents to us God's ſettling things by weight and meaſure, it ſpeaks not only elegantly, but exactly. For we do not mean by providence any extraordinary or ſupernatural interpoſition of almighty power, but the conſtant and ſettled order eſtabliſhed by the will of that almighty being, which we commonly call Nature.

There is nothing eaſier than for vulgar underſtandings to miſtake the meaning of words, and, by a ſuperſtition natural to weak minds, convert what they imperfectly underſtand into notions that perplex and confound them. Hence it proceeds, that, in common converſation one hears people ſpeak of nature as of a being, or a kind of ſubordinate deity; whereas, in reality, the true meaning of nature is, that order or law which God has eſtabliſhed in the univerſe; and the knowledge of nature is no more than the light we acquire by ſtudy into the connexion of thoſe laws. In this ſenſe, experience is a kind of revelation, that is to ſay, it is a ſort of knowledge that comes to us from without, and is infallible in itſelf. We may indeed go on wrong, and deceive ourſelves in the arguments we raiſe from it; but the knowledge grounded upon experiments never varies.

This is ſufficient to ſhew us, how much wiſer a thing it is to truſt this ſort of experimental knowledge, than to put any faith in that kind of idle ſcience which amuſed our forefathers, and enabled almanack-makers to delude and miſlead them. It is true, we uſe the luminaries as well as they, but then we uſe them in a rational manner, and do not pretend to impoſe this or

that ſign upon other people, but barely ſet down our own obſervations, which are to be examined and verified by the experience of thoſe to whom they are ſubmitted. The aſtrologer, on the other hand, inſiſts on what are not in nature; the twelve houſes are a mere invention, and ſo are all the properties aſcribed to the celeſtial ſigns, and to the planets; mere dreams and fictions deviſed by the cunning to cheat and impoſe upon the ignorant, and which had been long ago exploded, if people had brought them to the only teſt of which they are capable, I mean that of experience; with which they never did, never will, and indeed never can agree; whereas the rules given by our ſhepherd are ſuch as, we have ſhewn, ſuit perfectly well with the remarks of other ſtudious perſons in all ages.

XXVI. *If* October *and* November *be ſnow and froſt, then* January *and* February *are like to be* open *and* mild.

AS this obſervation ſtands on the ſame foundation with the laſt, we need not dwell upon it particularly: and therefore, I ſhall proceed with my former reflexions. The only way to be acquainted with nature, is to ſtudy nature. All ſyſtems of human invention, that are not built upon experiments, are ſooner or later found to be falſe, becauſe, to ſay the truth, they are nothing better than ingenious contrivances invented by the wit of man, to conceal his ignorance. In order to account for what we behold, we muſt firſt of all take pains to be well acquainted with the fact, and not ſuffer ourſelves to be led away by opinion. In order to explain what I mean, I ſhall give an inſtance: All the world knows, that not only the vulgar, but the learned, were for many ages in a conſtant error about corruption, and really believed, that the heat of the ſun, and even animal heat produced worms, maggots, and other living creatures. Many grave writers carried the thing farther, and told us of rats, mice, and

other creatures, produced out of the ſlime of the river Nile, by the heat of the ſun in Egypt, which might very well paſs for truth among thoſe who fancied they ſaw every day ſomething of the like nature: I mean in the corruption of fleſh and other things, in which we behold thouſands of living creatures.

An Italian philoſopher deſtroyed this whole doctrine at once, by a ſimple and eaſy experiment. He expoſed a piece of raw fleſh in a glaſs-veſſel, well covered with gawz, to the air and ſun, and found that it putrified, without producing any living creatures. This ſhews how careful we ought to be with reſpect to facts; for, till this experiment was made, no body doubted that vermin were bred by, as well as in putrified bodies; whereas we are now ſatisfied, that the heat of the ſun can no more produce a worm or a maggot, than a horſe or an elephant. By the ſame examination we might open the way to knowledge, by driving out a multitude of other errors: But the humour of taking things for granted, without inquiring into them, and then endeavouring to account for them by dint of reaſoning, amuſes us with a falſe ſhew of wiſdom, and encourages us to perſiſt obſtinately in the maintenance of weak and fooliſh notions.

To apply this to the ſubject of which we are treating. It is certainly a curious and an uſefull thing to underſtand the nature of the weather, and to know how the changes that happen in it come to paſs. The buſineſs is to find out the true way of coming at this kind of knowledge; and upon the principles that I have advanced, it is very evident, that the only certain way of coming at it, is by obſervation. This is a ſlow, but a ſure method of arriving at truth, and the ſpecimen here given us of one man's obſervations, is enough to convince us, that a little diligence and application would ſoon go a great way towards forming a body

of ſuch obſervations, as might enable us to underſtand the weather thoroughly, and to predict its changes and alterations with a great degree of certainty. If we will not take this pains, we muſt content ourſelves with what hath been already diſcovered; or if our conditions of life exclude us from the opportunities of making ſuch obſervations, it is certainly a right thing to help ourſelves by inquiring into, and reaſoning upon ſuch obſervations as other people have made; and to faciliate this as far as poſſible, I have taken the pains to write this commentary upon our ſhepherd's rules, which, I hope, will render them more uſeful, or, at leaſt, ſecure them that regard which they deſerve.

There remains therefore nothing more for me to do, in order to recommend theſe obſervations, but to ſay ſomewhat with reſpect to the utility of the alterations of the weather in general, and in particular. In order to ſatisfy the reader, that there is nothing of chance or accident in ſuch alterations, but that they are governed in every reſpect by the ſame unerring wiſdom, that at firſt framed, and conſtantly preſerves the univerſe: all weathers are at ſometimes ſeaſonable, which ſhews that they are good in themſelves, and only accidentally evil. We ought not to meaſure things of a general nature by particular rules. If, by the direction of providence, the ſucceſſion of ſeaſons be ſuch, as that they turn to the good of mankind in the whole; it is no objection to, or diminution of providence, that this ſucceſſion of ſeaſons ſhould at different times be injurious to certain countries, becauſe this may likeways be accounted for.

As to particulars, we will begin with the air, which is compoſed of exhalations of all earthly bodies, as well ſolid as fluid; as alſo of fire, whether of the ſun or the ſtars, or of earthly bodies burnt, or of fire breaking out from the entrails of the earth, and aſcending: and tho' it be thus compounded, and hath ſwiming in

it multitudes of other things, yet we find that it is perfectly wholſome, is the ſpring of motion and of life to men, and all other animals: ſo that tho' we cannot account for, and perhaps have not a power of comprehending, how ſuch a mixed body can be rendered ſalutary; yet ſince it is certain that ſo it is, we have no right to complain either of the evil conſequences that ſometimes attend the exhalations with which it is filled, or the accidents that flow from the frequent alterations that happen therein; becauſe theſe have a viſible tendency to the general good, and are apparently neceſſary to the preſervation of the univerſe: ſo that before we can have any title to find fault, we muſt firſt ſhew that we are capable of underſtanding them in their full extent; and as *this* is impoſſible, it follows *that* muſt be unreaſonable.

But this appears ſtill the more clearly, when it is conſidered, that all ſuch alterations may be ſhewn, even from the light of reaſon, to be generally uſeful, notwithſtanding they ſometimes appear troubleſome and noxious: For inſtance, ſuch quick ſtreams of air in motion as we call winds, though they ſometimes ſwell into ſtorms and tempeſts, yet are they of great benefit to mankind, by purging the air, and many other conveniencies. It is a proverb at Vienna, "that if Auſtria "be not windy, it is ſickly," and this ſaying is no leſs true in other countries; for, by conſulting the hiſtory of the laſt great plague that raged here in 1666, it will be found that there was in a manner a dead calm during the time of the ſickneſs; and it is known in Egypt, where they have plagues annually, that the change of the wind delivers them from that evil. Add to this the great uſe of winds in navigation, and reflect on the benefits that accrue therefrom, and we ſhall ſee no cauſe whatever to doubt, that this motion of the air is a very wiſe contrivance.

The condenſation of vapours, which is the cauſe of rain, is another great benefit to the world, in as much as this is very probably ſuppoſed to be the ſource of fountains, rivers, lakes, and other magazines of freſh water, without which the earth would be uninhabitable, and to which, in a very great meaſure, its fertility is owing. We ought likewiſe to remember, that tho 'this be in itſelf ſo clear, and, at the ſame time, ſo certain, yet there are countries in the world where it very ſeldom rains, as in Egypt, and others where it hardly ever rains, as in Peru; ſo that we ſee there is no raiſing general doctrines upon this ſubject, which ought to make us the more tender in diſputing the will of providence, or repining when it happens to croſs our own.

The uſes of ſnow are as great, tho leſs apparent, of which I ſhall mention but three. The *firſt* is, Its preſerving herbs and graſs in the winter againſt the ſeverity of froſt; *ſecondly*, Its ſupplying water to brooks and rivers; and, *laſtly*, Its furniſhing the earth with vaſt quantities of nitre, and thereby conducing greatly to its fertility; and perhaps the ſame thing may be ſaid of froſt, hard winters being often ſucceeded by luxuriant ſummers; and thus we find, that what, in appearance, cauſes ſcarcity, may, in reality, produce plenty.

Laſtly, Even thunder, however terrible in its appearance, and ſometimes fatal in its effects, is nevertheleſs very uſeful and beneficial upon the whole; for this likeways purifies the air from ſulphureous and oily exhalations, and the rains that fall with it fertilize the earth exceedingly: it alſo moderates the heat, as experience teaches us; for, as it is always gloomy and ſultry before thunder, ſo it is afterwards generally cool and pleaſant. Theſe remarks, tho' very ſhort, may give the reader an opportunity of extending his obſervations throughout all the variations of weather, and enable him to diſcern how uſeful and inſtructive a thing

the ſtudy of its alterations may be, and how probable it is, that, by proper care and attention, we may arrive at a much more uſeful, as well as a much more certain knowledge in regard to the weather, than hitherto has been attained.

I ſhall conclude, by recommending to the reader's peruſal a very curious and entertaining letter, tho' written in a plain familiar ſtile, which will ſerve to exerciſe his thoughts, by affording him an opportnnity of endeavouring to account, upon the principles before laid down, for the ſurpriſing varieties in that climate, which has been hitherto reputed the moſt irregular, and the moſt unwholſome in the world.

To Mr. W. D.

SIR,

I HAVE been very ill ſince my return home with the gout, ſo that I have not been capable of anſwering your expectation; but being a little better recovered, I ſhall make as good a return to your inquiry of the Harmatans on the coaſt of Guinea, as my circumſtances will permit. Their uſual time of blowing is between the latter part of December, and the beginning of February, before and beyond which ſeaſons they never exceed. They are of ſo very cold, ſharp and piercing a nature, that the ſeams of the floors of our chambers, and the ſides and decks of our ſhips (as far as they are above water) will open ſo wide, as that, with facility, you may put a chalking-iron a conſiderable way into them; in which condition they continue ſo long as the Harmatan blows, which is ſometimes two or three, and very rarely five days, which is the very utmoſt I ever obſerved or heard of; and when they are gone they cloſe again, and are as tight as if it had never been. The natives themſelves, and all perſons that inhabit thoſe parts (during that ſhort ſeaſon) to prevent their pernicious effects, are obliged

to confine themſelves within doors, where they endeavour their own ſecurity, by rendering their habitations as cloſe and impenetrable as poſſible: Neither will they once ſtir abroad, unleſs induced thereto by a more than ordinary occaſion. It is as deſtructive to the cattle alſo, whoſe ſafeguard conſiſts in their proprietors care, who, againſt this ſeaſon, ought to provide ſome ſuch-like place for them, otherways they muſt expect but a pitiful account when the ſeaſon is over; for it moſt certainly deſtroys them, and that in a very ſhort time.

This I accidentally experienced, by expoſing a couple of goats to the aſperity thereof, which, in four hours ſpace, or thereabouts, were deprived of life: Nay, we ourſelves (unleſs aſſiſted by the like conveniency, and the benefit of ſome ſweet oils to correct the air) cannot fetch our breath ſo freely as at other times, but are almoſt ſuffocated with too frequent and acid reſpirations. They generally blow between the Eaſt and Eaſt North-eaſt, to the Northward of which they never exceed, being the moſt ſettled and ſteady, but freſh gales, I ever obſerved; coming without thunder, lightening, or rain, but cloſe gloomy weather, the ſun not ſhining all the time: And when they expire, the trade-wind (which conſtantly blows on that coaſt at Weſt South-weſt and South-weſt) returns with the accuſtomary ſeaſonableneſs of weather.

The coaſt of Africa, from Cape Palmas to Cape Formoſa, lies Eaſt and Eaſt by North, and near thoſe points the land-breezes blow on that coaſt, which commonly begin about ſeven in the evening, and continue all night till near that time the next morning, during which interval, we are troubled with ſtinking fogs and miſts off ſhore, which, by the return of the ſea-breezes upon the oppoſite points, are all driven away, and we have the benefit of them in a curious freſh gale till about five in the afternoon.

And here let me note it for a general obſervation, that in thoſe and all other places within the tropics (as far as ever I took notice) the wind is drawn by the land; for, if an iſland or head-land were inclining to a circular form, the ſea and land-breezes fall in diametrically oppoſite to that part where you are: So that, if you are on the South-ſide, the ſea-breeze ſhall be at South, and the land-breeze (when it comes in its ſeaſon) at North.

In getting on the coaſt, we endeavour to fall in with Cape Mount or Cape Miſerada, which is about eighteen leagues to the Eaſt South-Eaſtward thereof, and after that we double Cape Palmas, (whence, as aforeſaid, the land trends away Eaſt by North) the current near the ſhore ſets upon that point down into the bite. But in getting off, we attempt as much as poſſible to lay hold of St. Thomas, and thence to run to the Southward of the line, perhaps three or four degrees; for the further to the South we go, the ſtronger we find the gales, and more beneficial for getting off the African coaſt, but thoſe who keep to the Northward thereof generally meet with more calms, and conſequently longer voyages enſue. In or about thoſe latitudes we continue, till we are got between twenty-five and thirty degrees to the Weſtward of Cape Lopez de Gonſalvo, and then we croſs again to go either for England or the Weſt-indies. But by the way, let me obſerve to you, that when once we are to the Weſtward of the Cape, and in South latitude, the current ſets Northerly, and the wind, to twenty degrees of latitude, is at Eaſt South-eaſt, as (to the like number of degrees) on the North-ſide of the line it blows at Eaſt North-eaſt; neither did I ever obſerve any mutation of the currents, unleſs in the Tornado-ſeaſon, when, during their blowing, they commonly ſet to windward, tho' perhaps the moon, upon full and change, may

have the like influence there as in other places; but I never took any particular notice thereof.

The ſaid Tornadoes uſually come in the beginnning of April, and ſeldom relinquiſh the gold-coaſt till July commences, and, with frequent viſits, make us ſenſible of their qualities. We have ſometimes three or four in a day; but then their continuance is but ſhort, perhaps not above two hours, and the ſtrength or fury of it may be about a quarter or half an hour, but accompanied with prodigious thunder, lightening and rain, and the violence of the wind ſo extraordinary, as that it has ſometimes rolled up the lead wherewith the houſes are covered, as cloſe and compactly as it poſſibly could be done by the art of man. The name implies a variety of winds; but the ſtrength of them is generally at South-eaſt, and, by ſhips that are bound off the coaſt, they are made uſe of to get to wind-ward.

I ſhall conclude with that moſt worthy obſervation of the ſeaſon wherein the rains begin, which, on the Gold-coaſt, is about the 10th of April; and this may be generally remarked, from thirteen degrees North to fifteen South-latitude, that they follow the ſun within five or ſix degrees, and ſo proceed with him till he has touched the tropic, and returns to the like ſtation again. This I ſhall illuſtrate by the following example; viz. Cape Corſo-caſtle lies in 4 d. 55 m. North. About the 10th of April the ſun has near 12 d. North-declination. At that time the rains begin and continue with the inhabitants of that place, until he has performed his courſe to the greateſt obliquity from off the equator, and returned to the like poſition South. The ſame I ſuppoſe may be obſerved and underſtood of other places within the tropics.

The variation (of which, in the year 1680, I made frequent obſervations) was 2 d. 14 m. Weſterly, and it generally flows at the aforeſaid place, South South-eaſt, and North North-weſt, upon the full and change,

the water riſing upon Spring-tides about ſix or ſeven feet up and down.

I remain, Sir,

Your humble Servant,

J. G.

Thoſe cold winds, called Harmatans, are not at all more extaaordinary than the burning winds on the coaſt of Perſia, which are terrible to the laſt degree, and in the months of June, July and Auguſt, render Gambroon, the only port which the Perſians have on that ſide, uninhabitable. Theſe winds blow in a very narrow compaſs, and are viſible, and therefore avoidable, which is done by throwing one's ſelf flat on the ground till they are paſt over. If a man is on horſeback when he meets them, he muſt diſmount, and turn his horſe's tail to the wind, and then, lying down by him, he preſerves the beaſt's life and his own.

There was, in the year 1712, a very ſingular inſtance of the malignity of theſe winds. Two French gentlemen would needs travel, in the month of July, from Gambroon to Iſphahan, notwithſtanding all that the chief of the Engliſh factory could ſay to diſuade them, believing probably, that what he told them was only the fables of the country, for which they paid dearly. The general rule for travellers is, to ſet out between three and four in the morning, and travel till nine, which rule theſe French gentlemen obſerved; and, being fatigued by their morning's journey, as ſoon as they came to a Caravanſary (which are lodgings built at every ſtage's end, a ſtage being about fifteen miles) they were diſpoſed to reſt, and ordered their ſervants to make their beds ready, (for even thoſe neceſſary furniture travellers are obliged to carry along with them on carriage-beaſts) directing them to call them when

dinner was ready, and withall ordered a ſheet for each of them to be dipped in water, to lay over them to cool them. One of theſe hot blaſts unfortunately came whilſt the gentlemen ſlept, and had left the windows of the room open, and the wind blowing in at the windows, ſcorched them both to death on their beds, where the ſervants found them when dinner was ready, and, pulling off the ſheets, the ſkin and ſome fleſh came off with them.

It is certainly a great happineſs to our country, that we have none of thoſe dreadful winds: but this however need not reſtrain us from endeavouring to diſcover their cauſes, and the manner of their extraordinary operations, which might perhaps be of uſe in accounting for damps in mines and other places, which induced me to give them a place here, as matters that could not be unacceptable to the curious.

FINIS.

(4)

A

SHORT TREATISE

ON

FOREST-TREES,

ACQUATICKS, EVER-GREENS,

FENCES and GRASS-SEEDS,

BY

The RIGHT HONOURABLE

The late EARL of HADDINGTON.

EDINBURGH:

Printed for JAMES REID Bookſeller in LEITH.

M, DCC, LVI.

SHORT TREATISE

ON

FOREST-TREES,

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FRUCES, and ORNAMENTALS.

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DIRECTIONS
FOR
Raising of FOREST-TREES.

CHAP. I.

INTRODUCTION.

HAVING been a diligent planter for upwards of thirty years, and having had more trees of my own planting, than, I believe, any man ever planted in his life-time, I have vanity enough to think my experience may be of use to my friends: and therefore I shall, in as plain and distinct a method as I can, tell the methods I have used; which, tho' they differ from almost all the treatises extant upon this subject, yet I dare answer there shall be nothing advanced in these papers, but what I can get attested to be matter of fact, and can shew the demonstration of upon my own grounds.

I have had great assistance from Mr. Evelyn, who wrote long ago upon this subject, and appears to be well skilled in it; yet he has been too credulous, and builds too much upon niceties that are altogether trifling and unnecessary, which makes me differ from him in many particulars.

Moses Cook, gardiner to my lord Essex, hath published a very useful book upon the same subject, which has likewise its own blemishes. All that have written in English since their time, have copied from them, even

to

to the ſetting down of their errors; and not only ſo, but have added many more of their own. Some have written like philoſophers, entertaining the fancy with airy, abſtracted ſpeculations, inſtead of conveying practical inſtructions to the inquiſitive reader; whilſt others, like quacks, promiſe a great deal, but perform nothing.

I ſhall not take up time in treating of the different ſoils proper for planting; but ſhall only tell in ſhort, that I never met with any ſoil that ſome one or other would not grow on. And as I go along in treating of every different tree that I have experience of, I ſhall tell the ſort, and the way and management of each kind, from its being in the ſeed till it is fit for the axe; beginning with,

The OAK.

Which is raiſed from the ſeed called the Acorn: Authors write of different kinds, but I know only of one, which I had all from England. It is certain that the Oak we have from abroad, for wainſcotting, and for barrels, is of a different kind; but I never could procure any Acorns from theſe countries.

Raiſed I have raiſed many trees by ſetting the Acorns in the ground where they were not to be removed; and I do think it the beſt way, if the vermin could be kept from deſtroying them. I have ſet ſome, with good ſucceſs, in very bare poor ground; when the ſame was fenced, and no cattle ſuffered to go there, the graſs has grown ſo rank, and it fell down and matted ſo cloſe together, that the young ſhoot could not force its way through; and the field-mice, harbouring there, have deſtroyed me many buſhels of Acorns; ſo that the way I have taken of late

is

is, to make a ſeed-bed of trenched ground, on which the Acorns are put, with the ſmalleſt end to the earth, and then covered half an inch deep. The beſt ſeaſon for this work is, when the Acorns drop in October, tho' I never could get mine ſo early; but I always put them in the ground as ſoon as I could procure them, if it was not in froſt. After they peep above ground, they may get ſome earth ſifted upon them; eſpecially if ſet in October, for the froſt may ſwell the ground and ſpue them out, and in that caſe they muſt be re-placed with the finger. After they have been in this bed for two full years, I adviſe the lifting of them; tho' ſome are for their ſtanding another year, by a notion that an Acorn in two years cannot have ſpent all its full ſubſtance into the plant; but I have been careful to obſerve that, and I could never perceive any part of it unconſumed. I therefore propoſe, that, after ſtanding two years in the ſeed-bed, they ſhould be planted where they are deſigned to ſtand: I thought this had been a notion of my own; but I ſaw, ſince I have uſed this method, a wood planted by a gentleman this way, that was in a very thriving ſtate. What put me on making this experiment was, that the trenching ground for nurſeries was expenſive, and the keeping it clean was a great trouble; and I had, for many years, ſet out my Firs from the ſeed-bed to where they were to ſtand, with good ſucceſs, as I ſhall explain when I come to treat of that tree. Another reaſon was my being convinced that every removal of a tree checks its growth, and if I could raiſe them all without tranſplantation it would be a great advantage.

From the Seed-bed.

Tranſplanted from Seed-bed.

All who have wrote on Oaks adviſe the cutting off the Carrot-root or pap, which I think quite needleſs, and therefore never practiſe. The writers on planting take

take up much time in giving directions as to the ſoil proper for Oak; but, as it is a tree that I like much, I have planted it every where, and find it thrive in rich, poor, middling, heathy, gravelly, ſpouty, clay and mofſy ground; nay, upon the dead land, and in ſhort on every ſoil that I have. And it is viſible that my Oaks grow faſter than any tree I can plant, the Acquaticks only excepted.

Soil.

Having ſaid ſo much, I ſhall now mention the diſtance I would have Oaks planted at. In all natural woods the trees ſtand cloſe to one another; but in time the leaſt thriving decay, or, by often cutting over, and the dropping of the trees that are left for timber, periſh: by this means large Oaks ſtand at a great diſtance; but I can by no means allow that they always did ſo, or that we ſhould, in a new plantation, ſet Oaks at forty, fifty, or ſixty feet diſtance; far leſs, as ſome modern authors aſſert, at as many yards. For tho we ſee great trees now ſtanding, it is more than probable that they were all formerly in a thicket, as Mr Cook hath made very plain in his chapter on Oaks; and experience may further teach us, that, if we ſhould plant at that diſtance in a country ſubject to winds, we ſhould have buſhes, but never trees. So that it is requiſite that we plant very thick, as ſhall be ſhown afterwards.

Diſtance of young Oaks.

Pruning. We now come to pruning. No tree ſhould be allowed to fork, I mean to put out two ſtems: one upright ſhoot ſhould only be encouraged; for when there are two or more, the ſap that ſhould run all into one, is diſperſed into many, and by this neglect, many millions of trees never come to the fourth of the value that they had arrived at, if due pains had been taken to have them trained up to one ſtem: ſo I recommend in the beginning to prune this and

all

all other Foreſt-trees when they are young; at the ſame time I am not for leaving the tree quite without branches; for ſome are neceſſary for drawing up the ſap: but I would only leave a few. If the tree hath been for ſome time neglected, begin at the undermoſt branches, and take them and the next row intirely away; but when you come higher up, prune off only a branch here and there; or ſhorten ſome of them, which muſt be cut away cloſe by the body of the tree the next ſeaſon: and take care to thin the head that the wind may get through; for, if the tree is top-heavy, the wind will take ſuch impreſſion on it, that it will either break ſhort, or be laid over, and perhaps never will be a ſtraight tree; by this way of doing, a tree may be brought to what height one pleaſes, without any more branches than what are neceſſary for drawing up the ſap, and to keep the tree upright. The cleareſt directions for this work are to be ſeen in Moſes Cook's 10th chapter, beginning at the middle of page 57th, where, I think, he names the moſt proper ſeaſons for the firſt and ſecond prunings of the Oaks, and all other trees that are not Ever-greens; and to him I refer my readers. Some lop, by that I mean, cut off the top of the oaks; but I entirely diſſapprove of that practice; for, the greater the height of an Oak, the greater the value.

There is another way of managing this, and all other trees, that I think may, if begun in time, be better than pruning; and that is, by rubbing off in the ſpring-time the buds from the ſides of the tree, ſince by checking the ſap's breaking out on the ſide, it forces it to riſe up to the top of the tree. *Budding.*

It were loſs of time to tell the uſes of this tree, ſince every body knows the value of it. Having thus far

ſar treated of the Oak, that hath ſo long maintained its title of the *King of the Foreſt*, I ſhall next ſay ſomething of,

The BEECH.

They who write of trees, mention two kinds of this; but I know no difference. They *How raiſed.* are to be raiſed from the maſt, which, if it could be preſerved from the vermin, ſhould be ſet in the ground without ever moving it; but that is ſo uncertain, by reaſon of the mice, that I am forced to ſow them in ſeed-beds, and to treat them every way as the Oak; ſo that I ſhall repeat nothing. But there is one great difference; for, as I ſaid, the Oak will proſper in any ſoil, yet *Soil.* the Beech is very ſhy. In good land they thrive very well, but I think not in clay; and I am certain not at all in wet ground; but, for dry and gravelly, none better. It is a beautiful tree, and, tho' when young they grow ſometimes crooked, yet, as they grow older, they turn ſtraight. This tree ought to be pruned and diſbudded as the Oak.

It makes a fine hedge for beauty in a wilderneſs; but I doubt it is not good for coppice, ſince I am told, it does not riſe kindly from the root when cut down; but of this I have no experience. It is a tree very proper for avenues, walks and groves; but, I think, were the timber of it leſs uſed for bed-ſteads, chairs, *&c.* it would be better; for the worm takes it very ſoon. In other countries it gives a great price for fuel; but, as we have ſo many coal-mines and moſſes, I hope we ſhall never be reduced to the extremity of cutting down our woods for firing. I now proceed to,

The

The ELM.

There are many different kinds of this tree, but I ſhall begin with that which hath grown long in this country, and is called the *Scots Elm*; of which there are many huge trees, both as to ſtature and greatneſs, remaining in many places, that if they had, in their youth, met with ſuch diſbuddings and prunings as I have adviſed, would have been ſurpriſingly beautiful and of great value; whereas they have been allowed to fork and run out into great arms; which is an irreparable misfortune, ſince the timber of the Elm is both ſtrong and of a fine colour, and prettily veined, very little inferior to the Mahogany, and ſome of the Weſt-India wood, ſo much demanded for tables, chairs, cheſts and cabinets.

Raiſed. This kind is propagated by the ſeed, which they carry plentifully every year, and is to be gathered about the beginning of June, which is the ſooneſt they ripen in this country; tho' Mr. Evelyn and his followers affirm, that it is ripe in the beginning of April.

The way of ſowing it, is in a bed well trenched and finely raked; then thruſt off ſome of the ſurface of the bed with the back of the rake; lay the ſeed over all the bed, as the gardiners do when they ſow Carrots; then draw the earth over the ſeed. When the plants have ſprung half an inch, it will not be amiſs to ſift on ſome fine earth upon them, to fix them the better; keep them free from all weeds for two years; then ſet them out for good and all.

Soil. I have always found this tree ſhyer as to the ſoil, than either the Beech or the Oak, and I cannot ſay that they thrive unleſs upon good ground; when ſuch is trenched and kept clean, they

proſper

proſper and thrive exceedingly: but, in bad ſoil, they are naſty, ſcabbed and hide-bound things, ſo that, in my opinion, it is loſt labour to plant them there.

Another kind of this tree, is what I have heard called the *London Elm*, which grows in great plenty in all the hedge-rows about that city: the long walk at Holland-houſe, and the incomparable one now hedged at Kenſington-garden are of this kind: it hath a much ſmaller leaf than the one I have been writing of. The cuſtom in theſe places is to cut off all the ſide branches cloſe by the body of the tree, and only leave a very ſmall head, ſo that in winter they look, in a manner, like a very high hedge, and, in the ſpring, are as bare as a May-pole, except the very ſmall head: how oft they repeat this operation, or what they make of the pruniags I cannot tell.

London Elm.

Of this tree they make great uſe for pipes for carrying in water to the town, and preſcribe ſeveral other uſes for it: but as my deſign is to teach the raiſing of trees in the cheapeſt and eaſieſt way, I refer my readers to Mr. Evelyn, or the carpenters, for the uſe of every tree.

I believe this one doth not carry any ſeed; but it is eaſily raiſed by layers and ſlices taken from the roots, or by ſuckers.

Raiſed.

Mr. Evelyn adviſes to propagte them after the following manner: "Take truncheons of the "boughs, and arms of Elms, cut to the ſcantling of "a man's arm, about an ell in length: theſe muſt "be chipped on each ſide oppoſite, and laid in trenches about half a foot deep, covered two or three "fingers deep with good mould: the ſeaſon for this "work is the end of January and beginning of February, if the froſt do not hinder; and after the "firſt year, you may cut or ſaw the truncheons off

"in

" in as many places as you find cauſe, and as the " ſhoots and rooted ſprouts will direct you, for tranſ- " plantation."

Another method propoſed by him is; " Lop a young " Elm, the lop being about three years growth, in " the latter end of March, when the ſap begins to " creep up into the boughs, and the buds are ready " to break out; cut the boughs into the length " of four feet ſtanding, leaving the knot where the " bud ſeems to put forth in the middle: enter theſe " ſhort pieces in trenches of three or four inches " deep, in good ground, *that is*, in good mould well " trodden, and they will infallibly procure you a good " crop." Beſides Mr. Evelyn's authority, I have been adviſed to the ſame by a gentleman who pretends to be a great planter; but as I have only tried them this laſt ſpring, I cannot promiſe for the ſucceſs as to this kind of Elm.

As this kind is not raiſed in the ſeed-bed, I believe it will be proper to have a nurſery ready to ſet them in for two years: this is a piece of ground trenched, and made free from ſtones, roots and weeds: in this ſet your young Elms, thus raiſed, at a foot's diſtance every way; and after two years ſtanding tranſplant them for good. *Nurſery, what.*

There is another kind of this tree, called the Dutch Elm; this will grow upon much coarſer ground than either of the other two. I am told they never grow to thirty feet in length; but as all I have are young, I have not experience of its ſize; neither do I know if it is of any uſe. It puts out a great number of trees and ſuckers, ſo that it ſpoils all graſs-walks within the reach of its roots. Some uſe this kind for hedges; but I think neither it nor the Scots Elm fit for that purpoſe, *Dutch Elm.*

purpoſe, their leaves being too broad and diſagreeably rough.

One thing I had forgot, which I ſhall ſet down here, as it is neceſſary for all the trees I have named or am to name, that, when they are ſet out for good, and eſpecially at two years old from the ſeed, care be taken to keep the graſs and weeds from growing about the roots, otherwiſe they may either choak or ſtrangle the young plant; and this I adviſe to be done with all the young plants, till they come away ſo heartily, that neither weed nor graſs can ſtop them in their growth. I come now to

The ASH,

Only raiſed by the ſeed, called the Aſhen-key. They are ripe in October, and ſhould then be gathered and laid in a bed, as I directed about the Elm-ſeed, and covered the ſame way: this I do as ſoon as they are gathered: but tho' they are ſown this ſoon, they do not peep above the ground till the ſpring come twelve months after. I chuſe to manage them this way, rather than be at the trouble of laying them in ſand for a year; after they appear they ſhould be let ſtand, and carefully weeded for two years, and then ſet out for good. I adviſe the ſame care in keeping them clean about the roots, the diſbudding and pruning them, as of the other trees I have mentioned. It is hard to ſay any thing of the ſoil they moſt delight in; for tho' the rich one is beſt, generally, for all kinds of trees; yet ſometimes an Aſh is ſeen to thrive very well where it is quite otherwiſe, tho' within two yards of the ſoil there are poor hide-bound ſticks. I know not if cutting ſuch by the ground in the ſpring may

How managed.

Plants.

Soil.

make

make them thrive the better, but I ſhall try it. This makes me wonder why they who have wrote about woods, ſhould lay it down as a rule, that, in planting woods, every third tree ſhould be Aſh, ſince it is a tree very ſhy, if the ſoil is not proper for it. In good ground, trenched and kept clean, they thrive prodigiouſly: it is long in putting out the leaf; but holds it long the ſame ſeaſon: they ſhed them as early as other trees.

It is of great and general uſe, and therefore it ſhould be encouraged where the ſoil is proper for it; but ſhould not, they ſay, be planted near corn-fields, its roots running within reach of the plough, and its leaves taint the graſs. This tree carefully managed, as I have directed, may be brought to great height and largeneſs, and of conſequence value. The next I ſhall take notice of is

The WALNUT,

Only propagated by the Nut: they talk of different kinds of it; but as all we get are from France, they ſeem to be of the ſame kind.

This tree, of all others, ſhould, if poſſible, never be removed, ſince it ſuffers more by it than any tree I know; but the vermin are ſo fond of it, that it is very hard to preſerve a ſingle Nut ſet, to ſtand from being eat by them: ſo I order them to be managed as the Oak. The ſide-branches and buds of this tree ſhould be carefully taken off; and, what I can never ſay too much againſt, forking ſhould be prevented; for no tree is more apt to fork than this one, and none loſes more of its value by doing ſo. This is the moſt valuable tree we have; had we greater plenty of it, the furniture of our houſes, ſuch as bedſteads, chairs, &c. that are now commonly made of

Beech, would be much handſomer, and more durable. Beſides, it is much ſought after by the cabinet-maker, ſo that I wiſh it were more propagated. The next I ſhall treat of is

The CHESNUT,

Which, tho' it can be raiſed from layers, comes much better from the Nut, and ought never to be removed; but as that is ſo difficult to do, the next beſt way is to manage them in all things like the Oak.

Set.

It is very apt to put out ſuckers from the roots, and many ſide-branches, both which ſhould be carefully taken off; for as it inclines to ſpread much if this is not done, it is not eaſy to get it to a great height, which, if care be taken of it, may be done.

Pruned.

Why a late reverend author hath placed the Cheſnut among the leſſer kind of trees, I know not, ſince I have ſeen them very high, and proportionally large; and that there is the remains of one in England, that, I think, hath been looked upon as the greateſt tree in it.

It is the beſt under-wood except the Mapple, and therefore is good coppice.

It loves the ſame kind of ſoil as the Walnut, which doth beſt upon a rich land.

Soil.

Whether theſe nuts produced in Britain will proſper, I have never tried; for, tho' ſometimes they are perfectly formed, grow hard, and ripen very well, yet theſe that come from France or Spain are much fairer; ſo that I always chuſed to ſet them. I have ſeen a room, which a gentleman wainſcotted with Cheſnuts of his own planting, which ſeemed

Spaniſh and French nuts beſt.

to

to me very pretty: and Mr. Evelyn tells many Uſes of them; but, as I ſaid before, that *Uſes* is not my buſineſs. There is another kind, called.

The HORSE-CHESNUT,

Raiſed by the nut, which is exceedingly better. I think it is the moſt beautiful tree I ever ſaw. It hath a clear, ſmooth, ſhining bark, and naturally grows upright; hath the broadeſt leaf of any tree we have. It carries a fair flower, moſt of them white, tho' I hear ſome have them red, delightful to look at, and is ſucceeded by the nut; but then it hath the misfortune to be very brittle, and cannot reſiſt the wind, that ſnaps it over when it is in its greateſt beauty; yet when cut hedge-ways, as one at Highgate, it ſtands the ſtorm, and grows to a tolerable height. But then the hedging of trees, in my opinion, takes away much of the beauty they have in their natural ſhape. It puts out its leaves among the firſt of our trees; but I never underſtood that it was of any kind of uſe; yet it is very ornamental, and I think, for that reaſon ought to be propagated, but not in woods, like the ſweet Cheſnut. I come now to *Beautiful* *Fit for hedging.*

The PLANE.

I believe this is what in England goes by the name of the Sycamore; and, as far as I can obſerve, it ſeems to have been the favorite tree of this country in the time of our forefathers; for there is no old ſeat, gentleman's houſe, or any place where trees are ſet to grow, but the Plane-trees are the moſt numer-

ous. It is raiſed from the Key, as the Aſh, but with this difference, that it ſprings up ſooner after ſowing, and the Aſh lies a year longer. When managed as I have adviſed of the other trees, it riſes to a great height and greatneſs, carries a fine broad leaf, and puts out, early in the ſpring, one kind a fortnight before the other, which is all the difference I know between them. It makes a fine ſhade, and never yields to the winds, unleſs raiſed, when young, under the ſhade of a wall that makes it ſhoot too faſt, and ſo when it gets above it, it is too weak to reſiſt the wind.

Soil. It is ſhy as to the ſoil, but will thrive where the Elm doth. I have ſeen a room in the ſame gentleman's houſe who wainſcotted one with Cheſnut, done with this tree. It looks very well and takes a good ſkin, but I am told it is very ill to work, and takes the worm very ſoon, unleſs varniſhed on both ſides. I am lately told, it laſts longer driven in the earth, by way of poſt, than any other timber that hath been tried. Mr. Evelyn and Mr. Cook ſay, that Deer will not touch it, tho' in a park: this I have heard likewiſe denied; but theſe authors ſay the ſame of

The HORN-BEAM.

They commend the raiſing of this tree from ſuckers or layers; but as I raiſe all by the

Raiſed. ſeed that carry any, I never tried that way. It lies as long in the ſeed-bed before it peeps as the Aſh, and ſhould be ordered the ſame way. It is ſaid that it comes to be a large tree, but all of them in this country are but young; nor did I ever ſee a tall one of them; for where they are in greateſt plenty, as in Hertfordſhire, they are all, as far as I could obſerve, Pollards; and I have ſeen it putting out freſh ſhoots from the lopped heads, when the

the tree was quite hollow, and only a ſhell left. I hear the timber is of uſe, but I know not for what. They do well in hedges, and keep feathered to the bottom, and, like the Beech, keep or carry the withered leaves till the new ones in the ſpring do thruſt them off. This makes them a great ſhelter to the trees that are to be ſurrounded by a hedge of them.

When deſigned for this uſe, they ſhould be clipped in the ſides only, and neither pruned nor diſbudded, but, if for a tree, ſhould be both, and never ſuffered to fork. I now proceed to

The SERVICE-TREE.

I am told of many kinds of this tree. I have but one, which hath a dark green leaf and pretty broad, and white on the underſide. It carries a cluſter of white bloſſoms, ſucceeded by one of red berries.

They are raiſed by the fruit; and make an agreeable variety when mixed with other trees: but whether it comes to be a large tree, or is of any uſe, I am ignorant; tho I have heard of one kind of Service-tree that is of as much value as the Mahogany. I make it my buſineſs to get ſeed of every tree I hear of, to make trials; but I go on to *Raiſed.*

The BLACK-CHERRY,

This is called the Geen here, and is of two ſorts: The fruit of the one is red, and of the other black: Both, if large, are very delicate, and much improved by grafting. It riſes to a great height and greatneſs, and is not ſhy as to the ſoil it is ſet in; hath a fine ſhining bark, is in great beauty in the end of April, and beginning of May, when it is all covered with white bloſſoms, and *Soil.*

in July with its fruit, which it ſeldom fails to carry. Mr. Cook talks much of this tree. It is very brittle; yet 'tis ſaid they make frames of it to their ruſh-bottomed chairs in Holland. It ought, in my opinion, to be propagated. I ſhall now write of a very beautiful tree,

The QUICK-BEAM,

For ſo it is called in England, but here the Rowan or Rhoddan-tree. The branches of this tree grow almoſt all upright, ſo that it is difficult to keep it from forking, yet may be done with care. It hath a ſmooth bark, a narrow leaf, and carries a fine cluſter of flowers in May, that makes a fine ſhow; and the plentiful crop of red Berries which hang on it, gives it a very rich look, and is a great relief to the Thruſhes and Black-birds.

Raiſed. It is eaſy raiſed by the Berries; rub off the pulp, and ſow the ſeed in the ſeed-bed: Do the ſame with the Black-cherry and Service. The Quick-beam ſeed is two years in the bed before it peep, as the Aſh and Horn-beam. I never ſaw but one of this kind that was large; it had been cut down, and came up in three great branches from the root, and therefore I doubt nothing of their growing great and high enough.

It thrives almoſt in every ſoil, and proſpers on rocks where there is very little thickneſs of earth. I am told by a friend, that, unleſs the earth is now and then ſtirred about the roots of them, they grow bark-bound and unthriving; but this, ſhould it happen, would be eaſily remedied. I think it ought to be more planted: It hath been little made uſe of in England, till of late, that they are got into the gardens of Kenſington.

ſington. Mr. Evelyn tells its uſes; but I ſhall name one which he doth not mention, which is, that the bark ſells to the tanners with that of the Oak.

I go now to a tree that I cannot charge my memory with having ever ſeen in England; nor did I even ſee it ever mentioned in any author, which I have wondered at; it is called

The LABURNUM, OR PEASE-COD-TREE.

I ſhall firſt deſcribe it, and then tell how it is raiſed. It hath a yellowiſh thin bark, with leaves almoſt of the ſame colour, ſhaped like the Trifoil. It puts out a flower like the Lilly-aſh flower; only it ſtands up, and is white or purple, but the Laburnum is yellow, and hangs down like a bunch of grapes.

I have ſeen ſo many on a tree of mine, *Fruit.* that it looked as if it had been all yellow. After the flower there comes as many ſmall peaſe-cods as there were bloſſoms, full of ſmall peaſe, which when ripe are gathered and threſhed. They do not value what ſoil they are ſet in, nor do they require much looking after. They are ſown in a bed, and removed at two years, and *Raiſed* then managed like other trees. The hares are ſo fond of them, that I ſet a great many of them to keep theſe creatures from my other trees: They are vaſtly bitter; both the bark and the ſeed are a ſtrong vomit. I have of them pretty high, and, I believe, with care may be trained up to great trees.

The timber is very hard, and of a fine colour, *viz.* a bright yellow with blackiſh purple veins. Were it large enough to be ſawn into planks, it would make moſt

moſt charming tables. The Quick-beam and this tree in a row, planted alternately, have very good effects. I go on to

The MAPPLE.

It is to be raiſed from ſuckers and layers, but beſt from the Key, like the Sycamore; which lies as long without ſpringing as the Aſh, and ſhould be managed in every thing like it.

Tho' we have few large trees of this kind in this country, yet I have ſeen them very great in England. 'Tis a beautiful tree, but the dropping is ſo pernicious to every other plant, that no tree will grow under it; tho' the Mapple itſelf will thrive under any thing, the Fir (which is the very worſt for under-wood) not excepted.

I have little experience of this tree myſelf. Mr. Cook ſays, it affects dry ground moſt, or a bank.

Mr. Evelyn is very eloquent in the praiſe of this timber, and is very extravagant when he ſpeaks of the high value which the ancients put upon tables of it. I know it is much ſought after by the cabinet-makers, and makes a fine hedge in a wilderneſs, changing the colour of its leaf twice at leaſt every year. I proceed to

The LIME,

It is beſt raiſed by the ſeed, tho' I could raiſe any that way; the reaſon I take to be is, that it doth not come to perfection here, and not every year in England. I have often given commiſſion to get it from Holland, but theſe I employed always neglected it; but I have raiſed many by layers. There are two kinds of this tree, both of which are raiſed the ſame way; the

the one with a large round leaf, and the twigs almoſt as red as Coral in winter: This I prefer to the other, which hath green twigs, and the leaf more pointed, and leſs.

Pruned.

It ſhould be much pruned; yet it ought to be done with the greateſt diſcretion: for if it is allowed to grow thick in the head, the wind may harm it.

Uſes.

It makes a fine hedge, either feathered from the root, and then it may be ſet at two foot diſtance, or ſet from ſix to ten, trained up to what height you pleaſe, with a clean ſtem, and then hedged above that, and either way very beautiful. Some rear them to ſtandards, and then clip them in pyramids; but I do not like that way, as it looks too conſtrained: beſides the natural ſhape of a Lime looks better. It grows to be a large tree; tho' I think it is more for ornament than uſe, yet Mr. Evelyn finds many. I now ſhall ſay ſomething of

The HAZEL,

Uſes.

Tho' I reckon it rather a buſh than a tree. They are raiſed from the nut, and managed like the other nuts I have mentioned; but as they are of much leſs uſe, I have been at leſs pains about them. They ſerve for under-wood, and for binding up faggots, and are of great uſe to the ſieve-maker; but after all, the demand for this plant is but very ſmall.

Soil.

Dry ground is recommended for them, but I am ſure I have ſeen them in a quite different ſoil.

I ſay nothing of the two kinds of Plantains, tho' they are coming in requeſt here, as I have no experience of them. I therefore conclude this chapter, and begin

CHAP.

CHAP. II.

Of AQUATICKS.

The BIRCH.

AN amphibious tree, that thrives upon rich, poor, wet, dry, ſandy or rocky land.

It hath a ſeed, but I am not ſkilful to direct how to manage it; but as ſoon as I am, I ſhall let it be known: The method I have hitherto taken, hath been to gather them in the woods, where they come up plentifully from the ſhaken or blown ſeed; but as the proprietors of theſe woods are not careful enough to keep cattle from paſturing in them, they are moſtly eaten over, and therefore I was obliged to cut them cloſe when I planted them: But as they begin to come up in my own woods, where no cattle come, I hope to be ſupplied that way, tho' the raiſing them from the ſeed ſhould miſgive, which I wiſh it may not, becauſe theſe thrive in whatever ſoil.

It ſometimes comes to be a great tall tree; it is excellent for coppice, ſmells ſweetly after rains, and no tree is more aſked after by the country people, both for their houſes, ploughs and utenſils of huſbandry.

The way I take to remove them, is to draw them with great care, either before or in Autumn, and ſet them where they are to ſtand for good. After they have ſtood for a year, cut them cloſe by the ground in the Spring; this will make them riſe in tufts, and they may be eaſily reduced to one ſtem, and ſo be brought to a tree.

By topping them in the Spring, they extract a liquor, which, after fermentation, becomes a ſpirituous, delicious

delicious wholeſome wine; but as I am not writing about brewing, I ſhall refer you to the two authors I have ſo often quoted, and to the tranſactions of the Royal Society, for the receipt of this wine.

I have planted many of this kind of tree, and intend to plant many more of them, if I live, ſince I think them more profitable than

The ALDER,

For which tree I have laid out more money than for all the reſt about this place; for I got them from Holland, and was not only impoſed upon as to the price, but had the misfortune to employ unſkilful people to plant moſt of them: They ſet them ſo deep that they fretted at the top, and died afterwards; ſo that they were twice cut over: They are more backward in thriving than any tree about this place; yet, I believe, there are more thriving ones, than, were they ready for the axe, I could get ſold. It is a handſome tree, with a broad, dark green leaf.

I know not of what value the timber is; but the branches cut, then fagotted, and laid in the bottom of drains for carrying off water, and whins or furzes laid a-top of them, makes it ſo that the ploughs go upon dry ground: This I have often done. The ſhade of this tree doth no hurt to the graſs.

I have been ſo little pleaſed with this kind, that I have not been at the trouble to know how it is raiſed; only I have cauſed gather them amongſt the old ones, as I do the Birch. They ſay they will do by cuttings laid ſome time in the water, then ſet like Willows.

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banks of rivers, to hinder the water from making breaches, the roots of it keeping the ground firm. I ſhall now ſay very little of

The POPLAR.

We have few Poplars of any ſize in this country that I know of, but having heard much of their height and greatneſs, I got ſome cuttings of them: They hitherto proſper very well: They have a whitiſh bark and green leaf.

What their uſes are, I do not know. They are raiſed by cuttings as eaſily as the Willow. I wiſh by the ſame means I could raiſe

The ABELE.

But as yet I know no other way than by the young plants, that run from the roots of an older one, or where there hath been once a nurſery of them; for were they never ſo carefully removed, yet new ones ſtill come up: Or if an Abele of a middle age is cut down, the ground about it wrought, and no cattle ſuffered to come near it, a nurſery of them may ſoon be got. I think the talleſt trees I ever ſaw were of this kind, and carried up a great body with them. I know none that runs up ſo quick as this does, planted in a bottom where it is ſheltered, but if expoſed to the winds, yields terribly. It makes an agreeable variety, mixed with trees of a deeper green; for the bark aud leaf are the whiteſt of any in this country. They are looked on as of little uſe; but an old gentileman told me, that, in a barn which he had roofed with Aſh and Elm, he put on ſome Abele, which laſted ſo well, that when the other were rotten, and he was forced to renew the roof, he left the Abele ſtanding

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ing as being quite ſound. I hear they make great uſe of them now in England.

They thrive ſometimes in ſpouty, and they do very well in ſandy ground, where ſcarce any thing can well be expected to grow, tho' ſome trees will, as I ſhall ſhew by and by. I own I am very fond of the Abele, and am reſolved to propagate them as much as I can. Now of

The ASPIN-TREE, OR QUACKING-ASP,

As it is called in this country; it is a tree that I would not have given place to in my papers, were it not that I am writing to encourage the propagation of trees; and therefore think myſelf bound, as an honeſt man, to give every one, who is at the trouble of reading what I write, warning, that I reckon it time thrown away beſtowed upon this weed, and therefore I root them out wherever I meet with them in my grounds. I heard them ſo much praiſed, that I was at a great deal of trouble to procure a quantity of them. I find them ſhyer to take with the ground than the beſt tree; but if once they do, there is hardly any poſſibility of rooting them out. They never, that I ſaw, riſe to any tolerable height or ſize. They decay by the time that other trees come to look well.

I know of no uſe that they are for; but their deſtructive nature I can atteſt, ſuch as running thro' the whole ground, ſpoiling the graſs and every thing elſe near them; ſo that, were my advice taken, they who are ſo unlucky as to have them ſhould root them out, and none ſhould attempt to poiſon their grounds with ſo pernicious a weed. Next of

The WILLOW.

Of this there are innumerable kinds. Mr. Evelyn names ſo many, and I have been ſo confuſed in reading him, that I could not know which of them to chuſe, till I had quite forgot what he ſaid; and therefore I ſhall only mention what I know by experience are the beſt kinds.

The only way I know of raiſing them, is, by cuttings, either in wrought ground, or by making holes with a ſtake, ſharpen'd at the end, and drove into the ground: When the ſtake is drawn out, ſet in the Willow, and fill the hole round it with earth to keep it firm.

The beſt kind I know to be raiſed to trees, is, what we call the Huntington Willow: It will grow almoſt as high and great as any tree, if it is allowed to run up, and care taken to keep it from forking and ſide-arms; or, if lopped above the reach of cattle, it will ſoon put out a large head, ſo that, in four or five years at the longeſt, theſe ſhoots may be cut; and, if they have room to ſpread, from every two trees a cart-load of large branches may be got, and ſo on for every four or five years. What advantage would this be to thoſe who cannot have coal and peat but at a very great diſtance and expence? I think it is worth their conſideration, tho' I had never weight enough to perſuade any in that ſituation to try it, tho' they had ground very proper for it. Nor doth the Willow, thus managed, and ſet at a diſtance, at all hinder the grazing. Stakes of ſeven or eight foot long, or as high as to be without the reach of cattle, may be ſet in February or October, without any heads, and, if the ſide-buds are rubbed off near the top, all the ſap will run up, and ſoon ſet out a head: But the diſbudding

ſhould

ſhould he continued for ſome years, till the bark grow ſo firm as not to put out any more: This is neither great expence nor trouble, and might be of great advantage, and ſave the lopping of more valuable trees; for it burns very well, nor do I doubt but the timber may be of uſe.

I have another ſort which might be managed the ſame way, tho' not altogether ſo quick a grower, and which ſome of my workmen ſay is almoſt as uſeful as the Oak, for fork, ſhovel, and ſpade-handles, nay, for ſome parts of carts.

Theſe two require a good ſoil, as doth the Bay-willow, with a bright, ſhining, green leaf.

There are many dwarfs among the Willows; but theſe I have mentioned may be called trees. I was once over-perſuaded to lay out too much money upon trenching ground for planting Willows for hoops, as a profitable return; but the yearly rubbing off the buds was a conſtant labour, and, when they were cut, I did not get ſo much as to make me think it worth while to continue the trouble.

The very worſt kind of Willow is for the uſe of the thatcher, and for binding faggots, beſides a ſmall kind of it for making baſkets.

Before I begin to ſpeak of Evergreens, I ſhall give ſome ſhort directions, beſides what are already mentioned, as to

THE METHOD OF PLANTING,

In which I ſhall deliver the methods I took myſelf, and which I have ſupported by my own experience.

I firſt trenched the ground, and then ſet the plants, ſmall and young; I think from the ſeed-bed beſt. I ſet them cloſe to one another, and the youngneſs of the plants made them take root ſooner than if

they had been older, and the ground became natural to them; the ſetting them cloſe together made every one ſhelter the other, and ſo riſe faſter: I then ſow'd Turnip-ſeed amongſt them; this kept down the weeds the firſt ſummer, and the Turnips being dug in the winter did great ſervice to the trees, and made the next cleanſing eaſier, ſo that the trees grew ſo faſt, that very much cleanſing was not neceſſary. To this it hath been objected,

OBJECT. I. Trenching is expenſive, and keeping the ground clean from weeds and graſs coſts labour, and, of courſe, money.

To this I anſwer; Trenching is to be done but once, and, as what I have ſaid of the Turnip is true, I hope that will not be ſo great a labour. I own it is expenſive to trench ground; but, when one ſees the advantage it is to the growth of their trees, I hope they will not grudge it to their wilderneſs, or near their houſes; eſpecially ſince the other methods I have propoſed for planting, are ſo much cheaper than what hath been put in practice by any body but myſelf.

OBJ. II. This way takes a great many plants.

I anſwer, It doth; But I have ſhown that they are for the moſt part raiſed from the ſeed, which is very cheap; that the making ſeed-beds is not dear, and that all trees ſhould be removed for good, after they have ſtood for two years, I mean, after their firſt peeping above ground, ſome lying longer before they appear than others.

OBJ. III. A great many trees muſt be loſt, when they are ſet ſo cloſe; one muſt kill another, ſince the ground cannot afford nouriſhment for them all.

I anſwer, I have proved that the expence is not great, and trees ſet cloſe together, force one another to run up; but, as ſome will always thrive better than others, theſe, with their dropping on the ſmaller ones, make

make them dwindle, and die at laſt; if ſo, the loſs is but a triffle. But I propoſe to cut down theſe unthriving ones, and perhaps they may ſhoot up for underwood, and by doing ſo, may often yield ſome profit, and can do no harm to theſe left ſtanding, as I ſaid about the Oaks. This hath been my practice, and I recommend it; tho' I was adviſed to lift the leſs thriving ones and plant them ſomewhere elſe; but this I could not agree to; for, in the taking them up, the ſpade muſt not only cut too much from the root of the plant to be lifted, but of thoſe deſigned to ſtand; ſo that I think the cutting of them down the beſt way.

As to the ground's not being able to nouriſh ſo many trees; I have ſeen a nurſery that was quite neglected, where the plants, having been at firſt ſet within a foot of one another, run up to a great height, and were ſo large that they almoſt touched one another; now, by my way of cutting them down, they will not require ſo much nouriſhment; but, if it ſhould be ſuſpected that they draw too much juice from the trees left to ſtand, it is eaſy to cut them below ground, and ſo to kill them.

Indeed, tho' ſome ſoils are of ſtiff clay, and that trenching is of great ſervice to them, the trees ought to be ſet upon the ſurface, and earth thrown upon the roots to keep them fixed, that the roots may take their own way.

Another ſpecial caveat that I would recommend, is, that all four-footed beaſts be kept from your ground. I did well enough to hinder all ſheep and larger cattle, yet the hares did me much harm; but I do all I can to deſtroy them too.

Now, tho' I have all along adviſed to plant the tree from the ſeed-bed, yet it may be neceſſary to plant walks, or carry views thro' incloſures or corn-fields;

in which caſe it will be fit to have plants taken from the ſeed-bed, and ſet in nurſery-ground, and ſeveral times removed, till the roots are ſo uſed to it that they may be tranſplanted, and their branches high enough to be out of the reach of cattle. I own this is a troubleſome work; but, as it is in ſome caſes neceſſary, ſo it is good to be provided for it: But I think ſuch trees, planted this way, ought to be ſtaked for ſome years, both to keep them from being ſhaken at the roots by the wind, and to be kept firm till they are ſtrong enough to bear the rubbing of beaſts. I ſhall ſay nothing of the tranſplanting of large trees in the middle of ſummer, ſince that is a work only to be done with few trees, and no great planter can ever make profit by that way.

One thing more, and I ſhall go to the Evergreens. If an Oak, Aſh or Elm is crooked, ſlit the ſtem quite through the bark, and it will grow ſtreight. Where any tree is eat by a beaſt, cut it off below where it is bit. I ſay nothing to the way of laying trees, or taking off ſlips with a little of the mother's root; nor of Suckers; becauſe every author hath a chapter upon this head, and no gardiner but knows it. I proceed, therefore, to the next thing propoſed, *viz.*

CHAP. III.

Of EVER-GREENS,

PARTICULARLY

FIRS.

AS I believe I have raiſed and planted out more of this kind of tree than ever any one man did, ſo I have

I have ſtudied the beſt methods of doing it, and have received but little help from any author in the management of it; for they all write ſo ignorantly about it, that I am ſurprized they were not aſhamed to ſet their names to a book containing ſuch manifeſt blunders with regard to this one tree. They plainly betray their want of ſkill, nay probity; and, what is ſtill more aſtoniſhing, that, inſtead of correcting the faults of other authors, they who have wrote laſt blunder moſt: But, as I am not to waſte my time in finding out the faults of others, I ſhall tell the methods I have uſed myſelf, for, at leaſt, the ſpace of thirty years.

In one of Mr. Bradly's monthly papers, there is a letter, ſigned JOHN EDINBURGH, that might have made them who wrote ſince, ſee, that the author of that letter underſtood what he was about; yet I differ in ſome things from him: And therefore I ſhall trace the Fir-tree, I mean the SCOTS FIR, from the time of gathering the ſeed, till the tree is ready for the axe; and, you may depend upon it, I ſhall ſay nothing but what I know by experience to be true.

It is only to be raiſed by the ſeed, which is contained in a cone, or, as it is called here, a clog, that hangs down from the branches. When I began to plant, my trees ſcarcely carried any, and I was at great pains to get the ſeed. I heard there were fine Fir-woods in the Highlands, where the inhabitants bring it in great quantities to ſell in the low-countries, and from whence I for ſometime brought my ſeed. The right way of getting the ſeed out of the cones, is to ſpread them upon a canvas, or ſome cloth expoſed to the ſun, and to have men attending to carry them under cover, when the ſun grows low, or when it threatens rain. The time of gathering the cones is in January or February, ſo that there is but little time for getting out the ſeed before ſowing-time, and therefore

we

we are diligent to take every ſun-ſhine to have the cones opened. When we ſee any number open, we put them in a Wire-ſieve, and ſhake them till the ſeed falls out: This is done till the latter end of April: then the ſeed ſhould be ſown, as I ſhall ſhow a little afterwards. The remaining cones are carried out of the ſun, and not expoſed to it till the hotteſt time in July and Auguſt; then they open very faſt, and are ſhaken in the ſieve till all the ſeed falls out. This ſeed I keep in tea-caniſters or dry bladders till next ſowing-time, in a dry, cool place, where no fire or ſun comes; but the Highlanders are too lazy to be at ſo much trouble; for after they have gathered the cones, they lay them upon a kiln; this opens them quickly, tho' it often over-drys the ſeed that it cannot grow. I own the cones may be opened before a fire, and little hurt done to the ſeed; but great care muſt be taken that they do not ly too near, or too long before the fire, leſt it be as bad as the kiln, and endanger your houſe, as mine once was, by the careleſsneſs of a ſervant-maid: After this I bought my ſeed from an old gardiner, till my own trees came to carry enough, from whom likewiſe I learned this way of keeping my ſeed over year.

Seed ſown.

Seed preſerved

In the end of April, I have ſeed-beds prepared, by trenching them pretty deep, and made as free from weeds, graſs, roots and ſtones as poſſible, and the earth made very fine. The ſoil ſhould be of a middle ſort, neither clay nor ſandy, neither too rich nor too poor; the earth turned off with the back of the rake, as our gardiners do for Carrots; then the ſeed ſown ſo thick as to cover the bed; and laſtly, the earth drawn over, till all the ſeed is covered: then in a few days I cauſe

Soil for a ſeed-bed.

ſift on ſome more fine earth. The next care is to preſerve it from the ſmall birds, who are very fond of it, and more ſo when it peeps; for the young plants bring up the huſks of the ſeeds upon their tops. I once had frames the breadth and length of the beds covered with nets; but of late I have boys that ſit by them from ſun-riſing till ſun-ſetting, till they are all come up, and the huſks dropt off. If the plants come up thick, as they ought, there will be no need of weeding them for that year they are ſown; but if any appear, they muſt be pulled up with great care, leſt, with the weeds, the young plants are alſo drawn. Before the winter I cauſe throw on ſome chaff or ſaw-duſt that hath lain ſome time, or what is beat from the flax when dreſſed; this preſerves the plants from the froſt, and may hinder the ground from ſwelling, which if it do, it is apt to ſpue up the young plants. In theſe beds they ought to ſtand two years, for example, from the latter end of April 1734, till the ſeed is ſown in March 1736: From thence to the end of April 1736, they ought to be managed in the following manner; When you take up your young plants, let there be ſtanding by a tub of earth and water, mixed to the conſiſtency of pap; in this let the roots be dipped: and on the roots of every ſix or ſeven handfuls of plants, laid in a baſket, lay a handful of this pap, to keep the roots from drying, which they are apt to do with either the ſun or wind, and one man can carry a great many this way. Formerly I had pits ready dug, and the earth with the turf undermoſt filled on, and then ſet the plant with a dibble, taking care to ſet it no deeper than it ſtood in the ſeed-bed; and this is a very neceſſary caution in planting

Seed-bed weeded.

Kept from froſt.

How managed when drawn for ſetting.

ing all kinds of trees: for deep ſetting is one of the greateſt errors. But now I have got a quicker way. I make one to go with a ſpade, who ſtrikes it into the ground, preſſes it backwards and forwards till the ſlit is made wide enough to receive the root, which the man with the baſket ſets in, and then with his foot preſſes the ſlit together. This way however will not ſucceed but where the ground is bare or poor; for if it is rich, or the graſs rank, it may ſmother or ſtrangle the plant: in that caſe the pits muſt be uſed, and, as I have adviſed about other trees, the graſs and weeds muſt be taken away from the roots, for, at leaſt, two years; againſt which time, I think, they will proſper, if cattle get not at them. But I believe, I have found out a better way for this, and all other trees of two years from the ſeed, which is, If a new plantation is deſigned, where the land is rank, the ſurface ought to be pared with a paring ſpade, and the turf carried off to be mixed with lime, or ſome other manure for enriching the corn-land. The ground being thus pared, the plants may be ſet as before directed. I have uſed this way with ſucceſs; for before the graſs and weeds can ariſe, the trees are out of danger from them. Others adviſe the letting Firs ſtand three years in the ſeed-bed, but I know it is wrong, having tried it, and they almoſt all died. Some adviſe removing them to nurſery, a needleſs expence! ſince they thrive better the other way, are eaſily carried, and ſave labour, time and trees.

How the Firs are ſet out.

The diſtance I ſet my Firs at is never above five feet, when I plant Oak, Beech, &c. amongſt them; but, when alone, nearer, in no regular way; for I don't think it a valuable tree. They look pretty at a diſtance in thickets, and in winter, and will thrive in the worſt ſoil, even in dead ſand.

It

It is ſurpriſing to ſee how faſt Oaks and other valuable trees will grow, when planted under the ſhelter of Firs: but I take particular care that the Firs do not hurt theſe trees, by leaning on, or over them; this I prevent by pruning the branches of the Firs every winter, after the ſap is at reſt by the firſt froſt: but, where both they and the other trees thrive well, I cut down the Firs to make room for the others. I was once a great enemy to pruning of Firs; becauſe what we get from Norway never meet with that treatment; but, ſince it would entirely ſpoil the trees amongſt them, if they were not pruned, I do it; but, where Firs ſtand cloſe together, and no trees mixed with them, I let them prune themſelves, which they do for want of air, and by rubbing upon one another: But, if they muſt be pruned, it is fit to begin only when the branches are ſmall, that the bark may the ſooner cover the ſcars; and, as they never ſhoot out on the ſides any more, this work is to be done but once in one place. What I propoſe is, after a Fir has been ſet out for three years, to begin and cut away the undermoſt ſtories or tiers, for that is the form they grow in, and after that take one off every year.

Beſt Firs. I now gather Cones from the Firs that have the reddeſt wood, eaſy to be known from their having been pruned; for, let people ſay what they pleaſe, as to there being but one kind of Scots Fir, and that all the difference we ſee in the timber is owing to the age of the tree, or the ſoil it ſtood on, I am convinced it is otherwiſe; for I once cut down ſome of about forty years old, which I thought grew too near my houſe, and ſtood within a few yards of one another; ſome of them were red and hard, others white and ſpungy, tho' the ſeed was all of one parcel, ſown in the ſame ſpot, and tranſplanted the ſame day.

Authors

Authors say they should be sown thin, six seeds in half a foot square; but I am never pleased if mine come not up as thick as Cresses. They likewise advise removing them from a seed-bed to a nursery; but, I hope, what I have said will convince you that the way I take is much better and cheaper. It is said that they will not grow on a sandy soil, but I can prove, by hundreds of thousands, that they do on dead sand, that had scarcely one pile of grass upon it. That there are many kinds of Firs, I do not deny, since I do not know if what grows in Norway be the same with ours. I am of opinion, that what comes from Sweden differs from the Norway Fir; and we have both the Pitch and Silver Fir very unlike our kind, but to be raised the same way. Joiners disagree about the goodness of the timber of the two last.

GREAT PINE, PINASTER. I have tried the Great Pine with little success; whether it was owing to the climate, or want of skill, I know not; but the Pinaster, managed like the Fir, doth very well.

EVERGREEN OAK, and CORK-TREE. Of other Evergreens that grow large, there is the Evergreen-Oak and Cork-tree. I have been told, that these two trees, managed like the Oak, grow large enough to be fit for ship-timber; but whether they will do so in this country I cannot hitherto pretend to say. I have raised a great many of them, but they are all of them very young; neither did I ever see a large one but once, and there was a high wall betwixt it and me; but they are much praised of late. I have raised a great many of them from the seed, but they are very ill to transplant, and the vermin are very fond of the Acorn; and, as I don't think the oldest

oldeſt I have ſeen in this country are pretty even in winter, I am not fond of them.

CEDAR. I doubt not but the Cedar of Lebanon, had we the Cones, would proſper as well in this country as the common Scots Fir, ſeeing I have ſeen them in very much expoſed places: For the Bermudas Cedar, all I ever ſaw of them ſeem to be Dwarfs, and a kind of Junipers.

YEW. The Yew, if not kept down by formal clipping, arrives to great beauty and value; but it requires many years, beſides care in the management, to bring them to a tolerable ſize; and therefore few care to plant them, ſince for theſe fifty years paſt, the clipping, and, I think, the ſpoiling of them has been in practice. I have now cut all the feathering off my Yews, and reduced them to ſingle ſtems; how they will ſucceed I cannot tell, but I ſhall never try to put any Evergreen in any ſhape but its own, unleſs in a hedge.

HOLLY. As to the Holly, when it is trained up to a tree, it is a very beautiful plant; but is likewiſe ſpoiled by clipping. I have obſerved that wherever there is a large Yew or Holly-tree every one is liberal in their praiſes; but, becauſe clipping them is ſo much in faſhion, none has courage enough to plant them for trees; tho' I not only do it, but have reduced my pyramids, and hope to bring them to their natural ſhapes.

BAYS. I intend to try the training of the Cherry-bay, and the Laurel to trees; and I have ſome young ones that give me great hopes of ſucceſs. There are beſides the Sweet-bay, Phylera and Alaternus; theſe I intend to raiſe to as great a height as I can. I have none of the large Box here, but I intend to get ſome. We have the Lauruſtinus and Arbutus, which are the only buſhes here; and a few Larch, which I believe may be worth while to

propagate: I neither like the Swediſh nor common Juniper, far leſs the Savine. I ſhall now ſpeak a litle of

A WILDERNESS.

As it is only raiſed for ſhade and ornament, and is laid out in what figure the owner pleaſes, there can be no rule given: They have not been long introduced into this country, and the way they were firſt laid out was, They firſt pitched on a center with ſtraight views from it, terminating in as fine a proſpect as could be had; then were there ſerpentine walks that run thro' the whole, hedg'd like the ſtraight walks, and the angles planted with variety of different trees; tho' now they are weary of the hedges. But people who make it their buſineſs to lay out ground for gentlemen, are, in my opinion, very unfit for it, for they are too formal and ſtiff; beſides they make every thing ſo buſhy that they croud the ground too much. Were I to plant a Wilderneſs, there ſhould be nothing in it but Ever-greens, Flowering-ſhrubs, trees that carry a fine bloſſom, and a kind of Willow that hath a bark of a bright yellow. In winter the Ever-greens look, when every thing elſe is bare. I ſhall now conclude all I have to ſay of trees, by adding ſomething

Of COPPICE.

I have read of many ways of raiſing them: Some adviſe plowing the ground with a good deep furrow, as a moſt expeditious way; but then this muſt be fallen about, at leaſt a year before ſowing; for the ground will require to be fallowed and made fine: But inſtead of ſowing, I would prefer the raiſing the plants in the ſeed-bed for two years, otherwiſe, ſome ſeeds lying in the ground ſo much longer than others, while they are

are cleaning the plants that are come up, they are digging up with the hoe, or treading down theſe that have not appeared. Others adviſe a ſtill more expenſive way, that is, to leave four foot of ſolid ground, then to dig up four foot next to it, and throw it upon that which was untouched; this will double the ground and make the plants grow better; they ſay the falling of they leaves will fill up theſe ditches, and the roots will run from one bank to another; but, as I never tried any of theſe ways, I ſhall not pretend to give any advice about them. What Coppice we have, ſeem to be natural. I have always diſapproved of cutting all down at a time, ſince, if ſome Seedling Oaks, or other fine trees were left to ſtand at every felling, they might come to be great trees, without doing harm to the under-wood, ſince the Mapple, the Sweet Cheſnut, the Hazel and the Sycamore will grow under the drop of other trees. I think a Coppice, eſpecially thus ordered, a pretty thing; but, as I want experience of them, I ſhall not go on writing in the dark. And now, having performed what I have promiſed, *viz.* to let you know my method of raiſing and managing trees, I ſhall next ſay ſomething of Fences.

CHAP. IV.

Of FENCES.

I HAVE tried many kinds of fences, but, not ſeeing theſe that were made here ſufficient, nor approving of the huſbandry of this place, I got a farmer and his family from Dorſetſhire, in hopes that he would inſtruct my people in a right way of incloſing, and teach them how to manage graſs-ſeeds. The firſt Fence he made was after this manner: He made a ditch four foot wide at top, and one at bottom; ſix foot from that, he made ſuch another: the earth of both he

threw between them; on the ſides of which he planted thorns, and trees on the top; but I found the cattle ſcrambled up and eat all the plants. I then made ditches as I had done before; but laid the firſt turf on the edge of the ditch, with the green ſide down; upon this I laid a row of Thorns at eighteen inches diſtance, leaving about an inch and half of the Thorn lying over the ditch, having cut away the reſt; theſe I covered with ſome earth, and laid another turf with the graſs-ſide outmoſt; then a row of Thorns upon it: but, tho' they were eighteen inches diſtant from one another, theſe being laid in the intervals, there was but nine inches betwixt them and the row below them. Upon this I laid another turf the ſame way, and a row of Thorns, or Quicks, juſt above the undermoſt row, and then threw the earth out of the ditch upon the Quicks; and as I did ſo upon the other ſide, the reſt lay betwixt the ditches: But I ſometimes left thirty, forty, or fifty feet betwixt the ditches, which I ſtuck full of trees, which I called ſtrips of planting: And, I think, where the Fences are ſufficient, that the trees may be brought up, ſo as it will have a very good effect, by beautifying the country, warming the ground, and raiſing ſo many more trees. But I did not find the Fences good enough, and therefore tried this method; I drew two lines, nine foot from one another, the length of the field; lifted the turf without the lines, laid them edge-ways with the graſs-ſide outmoſt; I raiſed both the banks together, filling in the earth that was pared off between them, till I raiſed a ſolid mount of earth five foot high, nine at bottom drawn in to three and an half at top. On this green bank I ſet Hollies upright, and the border they are ſet on being hollowed a little to keep in the moiſture, tho' they grew ſlow at firſt, are now a ſufficient handſome Fence. This was for the Fence on the road-ſide; but, dividing this field into

to ſix, I made only half-banks, that is to ſay, they were only graſs on the out-ſide, and the earth thrown up was wrought into a border, and the Holly-hedge planted on that: I then made a broad ſtrip of planting, and beyond that, the other Fence like the former. But the beſt and moſt ſecure Fence I have tried, except ſtone and lime walls, which are very expenſive, is the raiſing the banks, as I have ſet down in the ſecond place, but without Quicks; and when it is high enough, fence it up with dry ſtone: but it muſt be obſerved that this ſtone-wall muſt lean very little to the earth-bank, leſt the weight bring it down: then let it be pared in the Incloſure-ſide, which will make it ſlop to the wall. This earth being the beſt, as it is the ſurface, ſhould be thrown over the wall, to make a border either for Quicks or Holly. Theſe are ſome of the ways I have tried, and the laſt is the beſt. As ſtones are ill to be had, I am reſolved to follow the advice of a ſkilful gentleman living near Windſor-foreſt, to whom I wrote, and got the following advice.

"Since you tell me you are endeavouring to make "your fences good, and as I am in a country where, "I believe, they are the beſt and ſtrongeſt in Eng- "land, and made and kept the cheapeſt, I ſhall tell "you ſomething of them. You know, that, over moſt "of England, they make much uſe of the Sloe, "or Black-thorn, and common Bramble: I have "long been of opinion that a mixture of theſe makes "much the beſt fences for clipping. The White- "thorn-hedge, as in gardens, is an expence that far- "mers cannot be at, and without that they will grow "thin, ſo that the ſheep will get through, and the "greater cattle will ſoon follow; beſides the keeping "of them regular with ſheers is expenſive, and their "being kept low doth not warm the ground ſo well "as if high. They have ditches, as uſual, and plant "the hedges with White-thorn mixed with Mapple,

" Crabs, Hazel, Elder, Oak, Elm, and Aſh; and the
" banks on each ſide they ramm full of Black-thorn,
" Bramble and common Briar, to keep it cloſe at
" the root; and this makes ſo ſtrong a ſence that no-
" thing can paſs. It is neceſſity makes them keep
" their fences ſo ſtrong; for they cannot uſe paling
" but for a gate, and muſt not diſturb the deer if
" once they get within an incloſure, but ſtand with
" their arms acroſs and ſee a herd of them deſtroy a
" Coppice-wood, or a field of ripe corn, the incloſ-
" ed land being ſtole from the Foreſt; and if they
" don't ſubmit, the keepers will bring an action againſt
" them, which will end in ſhewing a title. I walked in
" lanes a mile long, with a hedge on each hand, ten
" foot high, ſo cloſe with Brambles interwoven with
" Crabs, White-thorn, Mapple, &c. that no bird
" could get through.

" When they cut over, which they do not ſo of-
" ten as in countries where their fences are only a-
" gainſt horſes and black cattle, they don't plaſh
" them, which weakens the roots, but cut them a
" foot and an half above the top of the hedge; for
" what is on the banks they cut cloſe; then they ſtick
" in dry Thorn-buſhes a-top, to ſtand as high or high-
" er than the ſtumps of the White-thorn, Crabs, &c.
" and hang upon the ſtumps, buſhes which cover all
" the ſides of the banks; and the roots of the ſtumps
" being ſtrong, they throw out ſhoots of half an
" yard long the firſt year; the ſtuff upon the banks
" runs up upon the dry Thorns, which have been laid
" on them as thick as in a ſeed-bed, and in two years
" a ſtag will ſooner take a brick-wall: The gate of
" ſuch an incloſure, if not ſtuck full of buſhes, is
" the weakeſt part of the fence. The Black-thorn
" is the beſt for their uſe; it is thicker, tougher, and
" laſts longer.

" A ſtrong hedge, when cut, yields a great deal of
" money,

" money, beſides paying the charges. They make " faggots of the Thorn, five or ſix foot long; theſe " they ſell to overſeers of the high-ways, who lay " them at the bottom with ſtones and gravel over " them: They are tough and don't yield to the " weight of the waggons, and laſt many years without " rotting.-------The large White-thorn, Mapple, &c. " make good faggots, and the ſmall of all kinds make " good bruſh-wood, and fire-wood for the common " people, who have no coal but from London.

" It is not to be believed how thick hedge-row " trees are, and once planting does for ever. When " they cut their hedges, which they do ſometimes, " both for profit and to ſecure their ditches, they " prune up all the young trees. The Elm here, you " know, comes from ſuckers; the Aſh, Oak, &c. " from ſeed, which drops into and is ſheltered by the " hedge, and gets up thro' it, that one may ſee the " fineſt young trees pruned up a man's height above " what is on the dike, when a hedge hath been late- " ly cut; and theſe trees ſtand from three to five " foot diſtance all along the dike. The Elms, and " ſometimes the Aſhes, that are well grown trees, " but not what is called timber, they generally prune " very high for the ſake of the burn-wood that is " got off, and to give air to the reſt that are lower of " all ſizes. They ſeldom prune up the Oak ſo high; " becauſe their branches pay well in bark and other- " ways, when old. In ſhort in the incloſed parts of " this coutry, it is common to have ſome hundred " pounds worth of timber upon an hundred pound " eſtate, as they either cut all the timber round an " incloſure at once, or pick them out every year; " for there is a ſucceſſion riſes, that every year the " timber yields as much as the land.

" They have ſeveral advantages in the thickneſs of " their hedge row trees; it makes the fence much

" the

" the ſtronger, eſpecially when new cut; for then " it ſtrengthens the dry hedge, and a ſtag will hardly " venture to bruſh thro' trees within three or four " foot of one another: By this I ſee the miſtake of " thinking that the putting ſo many plants in a bank, " between two ditches, hinders their growth; being " thus covered from the ſun, they keep in the moi- " ſture, and it is plain, where the bank is thickeſt, " every thing grows beſt.

" Of the Crab Apples they make Verjuice, and " the farmers ſometimes mix them with their Apples " for Cyder; for there is ſcarce one without a little " Orchard.

" The Elder berries are of great uſe: The Mapple " grows faſt under the drop of other trees, is a ſtrong " hedge, makes good ſtakes or burn-wood, and the " Bramble mixt with it, grows high on it, and on " the Hazel and Filberd, both which, when cut down, " run up preſently, and are thickened by the other " things I have before named. The young trees are " left, when the hedges are cut, from four to ten " foot high above the ſtumps of the hedge, and, in " about thirty or forty years, the Elms are fit for " many uſes, particularly for water-pipes. The uſe of " the Aſh at the ſame age is known every where: " The Oak requires double the time, but anſwers well " when timber. I managed my hedges in the ſame " manner, and had as much billeting from pruning " the hedge rows, and the pollards, as ſerved my " houſe in fire. I kept a rotation, by which I had, " and ever might have had, enough in the few fields " I reſerved for my own uſe. In ſeven years ſuch a " hedge may be again cut, but for deer they are " longer.

" I have obſerved very narrowly ſome fields, where " they cut every year timber to a greater value than " what the fields yield them; nay, double. I have

" computed

" computed upon the hedges round a ſmall field, of " four or five acres, lett for as many pounds, near a " hundred pounds worth of timber, and a ſucceſſion " of different ſizes, that, with care, may yield as " much more every thirty years; ſo that really a man " gets thirty years purchaſe every thirty years, for " the timber growing upon his lands, and the yearly " rent of his ground to the bargain, without any ex- " pence. Some weed them five or ten pounds worth, " as they have uſe for money: Some a whole ſide of " an incloſure, or two ſides at once: Others cut all " the timber-trees in one year." And now having given an account of the different kinds of fences I have made or heard recommended, I ſhall next ſay ſomething

Of GRASS-SEEDS,

A very great improvement: for the ground, immediately after corn, is many years before it ſwards, and many more before it can produce hay, or tolerable paſture. This improvement was new in this country, till I got the people from Dorſetſhire: I fell heartily to work, tho' the whole country, who are really diſcontented at any new thing, were angry with me. They had a poor opinion of a man's underſtanding, who would ſow graſs upon land that would carry corn. But if I ſhould ſow it upon meer out-ground, or what was poor, they would not blame me; but in that lay their miſtake; for in ſuch land, the crop of graſs is good for nothing; whereas in rich and well manured ground, the graſs is good, and ſoon fitted for corn.

Broad-clover. The Broad-clover with the red flower hath been long in eſteem; it is ſown in good ground after Barley, and harrowed with it: the finer the ground is made for this and all other

other graſs-ſeeds, the better. Twenty pounds of Clover is enough for a Scots acre, which is about a fifth larger than in England. I have ſeen this clover thrive ſo well, that, after the Barley was cut and carried off, the Clover was mowed and given green to cattle: the next year, if it was ſeaſonable, it was cut in the end of May, or beginning of June for hay. I ſhall ſay nothing of the making of hay, every day-labourer knowing it. After the crop is carried off, no beaſt ſhould be allowed to touch the field, and the Clover will riſe much thicker than it did before: When this is in the flower, it may be cut again for hay, and, by ſparing it a week or two, will yield good paſturage till wet weather, and then cattle ſhould be taken off, leſt they potch the ground. Indeed I moſt commonly keep the ſecond crop for ſeed, which will be ripe in about a month after it is in the flower: the hay of this crop is of no great value, yet black cattle will eat it. After the graſs is threſhed, the ſeed is got clean out of the huſk, and made ready for ſowing, by putting it a certain way thro' the mill. Clover, if ſown in proper good ground, may yields a crop of hay, another for ſeed, and good paſture in a year, for two or three years; after that it yields one good crop and paſture. But be-

Clover & Rye-graſs. cauſe Clover ſoon runs out of the ground, ſome ſow twelve pounds of Clover and three buſhels of Rye-graſs in an acre. This way the ſeed of neither can be had, becauſe the one is much ſooner ripe than the other, and but one crop of hay in a year; but this crop is ſo good as to make ſufficient compenſation, and holds for many years; eſpecially, if, inſtead of hay, it is ſometimes paſtured upon: Nor will this endanger the horſe, as they ſay the Clover doth.

Rye-graſs alone. When Rye-graſs is ſown without mixture along with the Barley, four buſhels ought

ought to be ſown in a Scots acre. If the ground is in good heart as it ought to be, it will proſper exceedingly, and the Trefoil, or Hop-clover, with a yellow flower, will come up very thick amongſt it. I have often tried to ſow this ſeed by itſelf, but in vain, altho' it comes with the Rye-graſs.

Small white Clover.

There is a ſmall Clover with a white flower, that is much in requeſt, and is reckoned the ſweeteſt feeding of any. It may be cut when green, and cattle are very fond of it; but I doubt it will ſcarcely cut for hay without it is mixed with Rye-graſs or Red-clover. I am told that it is the beſt paſture of any, and that it is much in uſe, and praiſed at preſent.

St. Foin, and Lucern.

I have tried St. Foin with very ill ſucceſs, and the Lucern with worſe, but perhaps it was the fault of the directions I got. The Rye-graſs and Clover I have great experience of, and therefore dare recommend them, and they who at firſt laughed at me are now following my example. Some indeed cry out againſt graſs-ſeeds, and the Rye-graſs in particular; how juſtly you may judge; for they ſowed it in their worſt lands, and took it ill that their crops were not as good as mine, who uſed it kindly. They ſay there is no plowing out the roots of the Rye-graſs, and of courſe they can have no corn: I own in ſo bad land they can have nothing; but my corn where my Rye-graſs was, was very good: But, if they will fallow and dreſs their ground, and not take too many crops of corn, and lay it down in good heart with Rye-graſs, I ſhall anſwer they will give over railing at it, or at me for recommending it.

Seaſons for ſowing.

The ſeaſons for ſowing theſe ſeeds are the ſame with that of Barley; but I have ſown the broad Clover in the beginning of March without any Corn, and it was thrice cut in the flower and eat by horſes

horſes in the houſe that ſame year; they may likewiſe be ſown alone in Auguſt or beginning of September.

I ſhall now end this long paper, and, if it can be of any uſe to my friends, I ſhall not grudge the trouble of it,

HADDINGTON.

P. S. In the preceeding treatiſe, I made very free with ſome late authors who have written upon Foreſt-trees; but ſince I wrote theſe papers, I have ſeen Philip Millar's Dictionary, and Mr. Ellis of Goodſeden's book, called the Hereford-ſhire Farmer; and, as I confeſs, they write like men who underſtood what they wrote about trees (except Firs, of which they ſeem to have had no experience) I thought it neceſſary to do them juſtice. When I wrote about the BIRCH, I promiſed to direct how to manage it, how ſoon I was informed myſelf. One of my ſervants pretends to know the way of raiſing it by the ſeed: His way is to gather it about the 20th of September, when it is full ripe; he then keeps it in a dry cool place till the month of February. The way of ſowing, is, to dig a piece of ground, ſomewhat moiſt, and when it is well raked and fallen, ſow it over the ground pretty thick, then chop it down with the back of the ſpade; for it will not bear covering: He then lays on Furze-buſhes over it to keep the birds from devouring the ſeed; when they have lain till it peeps, take the Furze away, and you will ſoon ſee the young plants appear. In this ſeed-bed let them ſtand two years, and then put them into the nurſery, or ſet them out for good.

I muſt likewiſe add, that, tho' what I have ſaid about the Alder, and the ill ſucceſs I have had with them, be true; yet I have ſince ſeen many good and thriving plants of that kind; and a gentleman, whoſe opinion I rely upon, has blamed me very much for what I ſaid in prejudice of them; and aſſures me they are of great uſe. I own it is a fine tree, and, when rightly managed (which mine were not) may come to anſwer very well. This I thought fit to be added, leſt I ſhould be blamed for ſpeaking ſlightingly of a tree that may be of value: And I am not aſhamed to be convinced of an error, nor to amend it.

FINIS.